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BUREAU OF MINES
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INFORMATION CIRCULAR

GEOPHYSICAL ABSTRACTS 126

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V. L. SKITSKY

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July - September 1946[1]

Compiled by V. L. Skitsky[2]

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FOREWORD

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1. GRAVITATIONAL METHODS

8644. Albin, Adriano. Un gravimetro pneumatometrico (A Pneumometric Gravimeter). Geofis. Pura. & Appl., Milan, vol. 3, No. 3, 1941, pp. 165-168.

The author discusses the development of gravity measurements and offers a new type of gravimeter based upon the pneumatic principle. The original and the latest model of this apparatus are described, and the mathematical equations underlying measurements are deduced. The first model, devised in 1928, consisted of two cylinders connected by an L-shaped capillary tube; the present model has one spherical container with a horizontal, U-shaped, capillary extension over it. In both models, variations in gravity are measured in terms of the weight of a column of mercury and the gas pressure necessary to support it in the capillary tube; a change in gravity affects the weight of the mercury column and the respective pressure and volume of the gas in the container. The application of this principle by H. Haalck in 1932 gave good results. - V. S.

Barsch, Otto. Aufgaben der angewandten Geophysik in Grossdeutschland und im östlichen europäischen Raum (Problems of Applied Geophysics in Wider Germany and Eastern Europe). Jahrb. d. Reichsamts für Bodenforsch., 1942, Berlin, vol. 63, 1944, pp. 682-780. (See abs. 8737 in this issue).

8645.Boyd, L. H. Gravity-Meter Survey of the Kettleman Hills-Lost Hills Trend, California. Geophysics, Menasha, Wisconsin, vol. 11, No. 2, 1946, pp. 121-127.

The gravity anomalies produced by the three Kettleman-Hills domes are maxima. The Lost-Hills anticline produces a gravity minimum. Four maps showing gravity contours, subsurface contours, and sections accompany this paper.

Maps from a gravity survey over the Kettleman Hills-Lost Hills area are compared with previously published subsurface contours and cross sections. These show that each of the three Kettleman-Hills domes produces a strong and definite gravity high, whereas the Lost Hills anticline produces a very clear and closely corresponding gravity low. The paper points out the probable cause of this unusual feature as being a transition within the Reef Ridge formation from punky, diatomaceous shale at Lost Hills to clays and sands at Kettleman Hills. - Author's abs.

8646.Bulanzhe, Iu. D. On the Calculation of the Effects of Variation in Chronometer Motion on Pendulum Observations (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 1, 1945, pp. 49-62.

The precision of pendulum measurements of gravity depends largely on an accurate correction for variations in the motion of the chronometer. Yet, the currently used method does not fully account for the variations occurring during the interval between successive corrective determinations. This interval usually is represented by separate series of pendulum oscillations between which the pendulum is not observed. In the present paper, the resulting systematic errors are examined mathematically; equations are first deduced for the generalized problem and then employed for an approximate determination of errors by application of graphic means. Several particular cases close to actual practice are analyzed.

The formulae obtained have been employed for computing the errors occurring in a field survey. It was found that the interval between successive corrections for chronometer variation should be filled in by observations of pendulum oscillations to the extent of 95 percent rather than 85 percent, as recommended by the Instructions for Gravimetric Surveys, 1937. Then the effect of chronometer variation on the average period of pendulum oscillation would not exceed 0.5 x 10^{-7} sec. A special method of radio signals is also suggested for reducing chronometer errors. - V. S.

8647.Coulomb, Jean. Séismes profonds et grandes anomalies négatives de la pesanteur peuvent-ils être attribués à une extension plastique? (Can Deep-Seated Seismic Activity and Large Negative Anomalies of Gravity be Attributed to a Plastic Expansion of the Earth?). Ann. Géophys., Paris, vol. 1, No. 3, 1945, pp. 244-255.

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An account is given of a previously suggested theory holding that deep-seated seismic activity and zones of negative gravitational anomalies indicate the formation of inclined surfaces. These serve as gliding plane in the initial plastic expansion of the earth resulting in ultimate thermal contraction, as described by H. Jeffreys. The author recognizes that such a theory has its weaknesses; its merits consist in establishing a relationship between gravity anomalies and seismic activity and showing that deep-seated seisms should be expected over inclined surfaces. - V. S.

8648. Deegan, C. J. Exploring the Continental Shelf. Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 6, 1946, pp. 98-101.

The R. H. Ray Co., Houston, has developed two types of diving bells for gravimetric exploration under water. (1) The smaller type, with several models, is designed for shallow water up to 40 feet deep. It has a conical shape, broad base, low center of gravity, and low profile, which aid in keeping it steady despite wave action and bottom mud. As many as 25 stations have been occupied in a day. (2) The large type of the bell is suitable for water up to 250 feet deep. It weighs nearly 5,000 pounds and consists of two concentric steel cylinders welded to a common base. The space between the cylinders is used as a ballast chamber; the observer works inside the inner cylinder. This bell can occupy up to 10 stations per day.

Specially designed and equipped boats are used for hoisting. The observer has at his disposal a telephone, air hose, and electric circuit. Successful gravity measurements were made off the Gulf coast and the coast of Cuba as well as in Lake Maracaibo, Venezuela. - V. S.

8649. Enslin, J. F. A Comparison of the Gravimeter and Torsion Balance Metho of Geophysical Prospecting. Trans. Geol. Soc. South Africa 1944, Johannesburg, vol. 47, 1945, pp. 283-299.

After a concise theoretical consideration and the derivation of the probable errors of observations by torsion balance and gravimeter, the applicability of these instruments to typical geological problems is discussed. - Author's abs. (Discussion by J. Taylor, O. Weiss, and the reply of the author are given in Proc. Geol. Soc. South Africa 1945, vol. 48, 1946, pp. 57, 59, 75. - V. S.)

8650. Hedstrom, H. Report on Test Made with the Nørgaard Gravimeter in Nottinghamshire on 8th May, 1946. Craelius Co., London, 1946, 10 pp.

An account is given of a recent demonstration in the use of the Nørgaar gravimeter conducted in the vicinity of the Eakring oil field, Nottinghamshire, by the Electrical Prospecting Co. of Stockholm. Readings were taken at three stations where the gravity values are known from previous surveys; the geology of the carboniferous limestone of the area also is known. The conditions of the Eakring test, the readings made, the temperature and drift corrections, and the theory and construction of the instrument are described (see also Geoph. Abs. 125, No. 8489).

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The Nørgaard values of gravity differences between the three stations have compared with the previously obtained values, as follows: Kirklington-Southwell: 5.34 mgl. vs. 5.46 mgl; Southwell-Oxton: 5.19 mgl. vs. 5.19 mgl. (A review appeared in Min. Mag., London, vol. 75, No. 1, 1946, pp. 21-26.) -V. S.

8651. Horton, C. W. Interpretation of Isostatic Anomalies South of Java, Using Integral Equations and Crustal Deformation Theories. Geophysics, Menasha, Wisconsin, vol. 11, No. 2, 1946, pp. 183-194.

The gravity measurements of Vening Meinesz show the existence of a symmetric belt of negative gravity anomalies south of Java. The mass distribution on a surface 40 km. deep, which will explain the observed anomalies, is determined by the author by means of an integral equation. This mass distribution is interpreted as resulting from the deformation of a crust normally 40 km. thick. By applying Vening Meinesz's theory to the resulting deformation, one concludes that the crust folded as though it had a Young's modulus of 10^8 dynes/cm^2.

Some comments are made on Gunn's theory of mountain formation. It is shown that his theory predicts an increase in the compressive forces in the crust of 20 dynes/cm^2/year in the Paleozoic era and of 80 dynes/cm^2/year in the Cenozoic era. These values are shown to be in fair agreement with those predicted by the thermal-contraction theory. - Author's abs.

8652. Kazinskii, V. A. On the Precision of the Determination of Gradients of Curvature (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 4, 1945, pp. 382-388.

Variometer measurements give the second derivatives of the potential of gravity expressed by formulae comprising the gradient of turbulence T. This gradient characterizes the undulations of the geoid and the heterogeneity of the earth's crust, and its second derivatives, termed gradient of gravity and gradient of curvature, have much value for geophysicists. However, the gradient of curvature receives little application because it is deemed to be more dependent on topographic relief than the gradient of gravity. Such view is caused by the inclusion of r^3 (distance) in the expressions of the integrals used for reduction.

The author has calculated the effects of relief upon the gradients of gravity and curvature both for the data of laboratory experiments and for 90 variometer stations in the Moscow district. The empirical results showed that the precision of reduction is about equal for both types of gradients. An explanation of such findings is sought in the total products $r^2h^2\text{Sin}\alpha$, $r^2h^2\text{Cos}\alpha$, $r^3h\ \text{Sin}2\alpha$, $r^3h\ \text{Cos}2\alpha$, and their sum entering into the reduction integrals, rather than in the value of r^3 alone. It is pointed out that the varying signs of h, Sinα, and Cosα produce both positive and negative values of these products and lead to their balancing. - V. S.

8653.Maree, B. D. The Vredefort Structure as Revealed by a Gravimetric Survey. Trans. Geol. Soc. South Africa 1944, Johannesburg, vol. 47, 1945, pp. 183-196.

Large and easily recognizable gravitational anomalies were found to exist in the sedimentary belts of this structure, and when these anomalies were traced to the covered southeastern portion, the structure was found to have rather the shape of a pear, with its smaller end pointing to the southeast, instead of being circular. Based upon this new information and the regional distribution and attitudes of the gravitational anomalies and geological structures, a new explanation of the origin of the structure is put forward. - Author's abs. (Discussion by J. Ellis, J. Taylor, O. Weiss, and the author's reply are given in Proc. Geol. Soc. South Africa, 1945, vol. 48, 1946, pp. 49, 54, 55, 71. - V. S.)

8654.Miller, A. H. Gravimetric Surveys of 1944 in New Brunswick (abs.). Trans. Roy. Soc. Canada, Ottawa, 3d ser., vol. 39, 1945, List and Minutes, p. 145.

In addition to other work in the Maritimes, several hundred miles of gravimeter traverse were made over the Carboniferous basin between Moncton and Bathurst with the object of finding buried pre-Carboniferous ridges that are presumed to underlie the flat-lying Carboniferous sediments. The profile of gravity across the basin is a series of "highs" and intervening "lows." Certain of the axes of strike of the anomalies, inferred from more or less parallel traverses, may correspond to structural axes. The salt deposit at Weldon is indicated by contours of low values of gravity. - Author's abs.

8655.Nettleton, L. L. Geophysical History of Typical Mississippi Salt Domes (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 98.

This paper gives the results of gravity and seismograph exploration of typical shallow domes in the Mississippi salt-dome basin. The domes were first indicated by reconnaissance gravity surveys and were further defined by detailed gravity surveys. Depth and configuration of the cap rock was determined by refraction seismograph surveys. The geophysical predictions are compared with the findings of subsequent drilling. - Author's abs.

8656.Pawlowski, Stanislaw. Pomiary grawimetryczne w Polsce do r. 1938 wlacznie (Gravimetric Measurements in Poland through 1938). Panstwowa Sluzba Geologiczna, Warsaw, Bull. 18, 1939, pp. 46-51.

A review is presented of gravimetric exploration in Poland from its beginning in 1866 to 1938. The initial surveys are indicated briefly; the more active work of 1926-36 is given fuller consideration, with statistical summary; finally, the latest exploration of 1937-38 is described in some details. In the last-named period, surveys were made with the Thyssen gravimeter in western and eastern Poland and in the pre-Carpathian region; some particulars of operational techniques are specified. In all, the results now give the distribution of gravity anomalies over entire Poland, as shown on the appended sketch map. The account of gravity work is accompanied by brief outlines of magnetic, seismic, and electrical investigation in Poland. - V. S.

8657. Scheffer, Vittorio. L'anticlinale gravimetrica di Fontevivo (The Gravimetry of the Anticline of Fontevivo). Geofis. Pura & Appl., Milan, vol. 3, No. 1, 1941, pp. 12-13.

The anticlinal formation of Fontevivo, Parma, was explored gravimetrically in 1940 to aid geological mapping. The Humble-Truman gravimeter served for the survey which occupied 63 stations. In 1928, the same area had been surveyed with a German torsion balance by A. Belluigi over 400 stations. The results of the two investigations are compared and found to agree closely; the values of anomalies almost coincide. The isogam maps obtained by the two methods are presented. - V. S.

8658. Vening-Meinesz, F. A. Topography and Gravity in the North Atlantic Ocean. Proc. Nederl. Akad. Wet., Amsterdam, vol. 45, No. 2, 1942, pp. 120-125.

During the gravity expeditions at sea conducted by the Netherlands Geodetic Commission, numerous observations were made over the Azores Archipelago and between the Azores and Europe. Recently, this material has been subjected to reduction by means of the new tables for regional and local isostatic compensation calculated according to the Airy system.

The results indicate that some of the topographic features are more or less locally compensated and others are regionally compensated. In the Azores, the Sao Miguel and Fayal Islands show a much smaller degree of regionality than is usual for volcanic islands. To the west and southwest of the Azores, stations over deep water are in better agreement for local than for regional reduction. In the Iberian peninsula, the Josephine Bank appears regionally compensated in the west and locally compensated in the north; the submarine promontory west of Cape Finisterre is locally compensated in the south and regionally compensated in the north. Some other results obtained by the compensation of anomalies are described. One of the explanations suggested for disturbances of isostatic equilibrium is the rising of heavy magmatic material in the deeper layers and the failure of the corresponding adjustments to keep pace therewith. - V. S.

2. MAGNETIC METHODS

Aerial, Geological, and Geophysical Survey of Northern Australia. Geophysical Survey of Redbank Copper-field, Northern Territory. Report for period ended 31 December, 1940, Canberra, 1942, pp. 60-63. (See abs. 8705 in this issue.)

8659. Balsley, J. R., Jr. The Airborne Magnetometer. U. S. Geological Survey, Washington, D. C., Geophysical Investigations, Prelim. Rep. 3, 1946, 8 pp.; also Petrol. Eng., Dallas, Tex., vol. 17, 1946, No. 11, pp. 77-87, No. 12, pp. 104-130.

The airborne magnetometer for geophysical exploration, developed jointly by the Naval Ordnance, Bell Telephone Co., and U. S. Geological Survey, is a flux-gate detector that measures total magnetic intensity electronically, with continuous registration of readings on a standard record chart. The sensitivity and base-line value can be varied instantly in 50 to 5,000 gamma steps by special controls, the sensitivity being registered on the record chart; the recording meter also may be adjusted to any horizontal scale, the most practicable being 0.5 to 2.0 miles to the inch.

During flights, the detector proper is towed in a bomb-shaped shell on a 100-foot cable to eliminate the magnetic effects of the plane. The method of survey generally consists in covering a series of parallel traverses 50 miles long made at right angles to the geological grain while maintaining a constant average height. In land surveys, ground orientation is gained by a gyroscopically stabilized continuous-strip camera and a radio altmeter. Over water or unmapped areas, the radio navigation aid Shoran can be used to record distances from two ground stations. The flight data eventually are coordinated by means of a mechanical device, which transforms the recorded curve to orthogonal coordinates, corrects discontinuities in the recording, and adjusts the distance scales. The profiles are then plotted on a magnetic contour map.

Magnetic surveys from the air have the advantages of precision, speed, ease, economy, and access to impassable terrain, but also the disadvantages of close dependence on the accuracy of ground maps and use of large airplanes and heavy equipment restricting the work to large-scale exploration. - V.S.

8660. Barnett, S. J. Two Electric Generators Suitable for the Measurement of Magnetic Intensities and Their Variations, and for Other Purposes. Terr. Magn. & Atm. Elec., Baltimore, Md., vol. 51, No. 2, 1946, pp. 147-162.

The detection and measurement of magnetic intensities has often been made by means of rotating coils with terminals connected through commutators to measuring devices. However, such apparatus have their disadvantages because of the fine coil wire necessary for high sensitivity and the sliding contacts with the brushes. The author overcomes these difficulties by using a fixed coil with a large constant and combining it with a toroidal ring of low resistance rotating inside the coil. In a later model, the ring is replaced by a group of rotating magnetic rods. The theory of the ring generators and rod generators is presented, and the experiments, results, and applications are described. The generators can serve as vertical intensity variometers. - V. S.

Broadhurst, E. Geophysical Prospecting at Moonta and Kadina. Chem. Eng. & Min. Rev., Melbourne, Australia, vol. 38, No. 450, 1946, pp. 197-203. (See abs. 8709 in this issue.)

8661. Digiesi, Domenico. La carta magnetica della Libia recentemente compilata dall' Istituto Geografico Militare (Magnetic Map of Libia Recently Compiled by the Military Geographical Institute). Geofis. Pura & Appl., Milan, vol. 3, No. 2, 1941, pp. 45-51.

In 1938-40 the Italian Military Geographical Institute made a survey of magnetic declination in Libia. A total of 203 stations was occupied with the apparatus of Chasselon, a magnetic theodolite, and a compass, in conjunction with preliminary photogrammetric reconnaissance. The phases of the work are described, and the principal data are tabulated. The results have been embodied in an isogon map referred to January 1, 1941, which is appended. It reveals strong anomalies south of Tripoli. - V. S.

8662. Dufay, Jean, and Flajolet, Philippe. Relation entre l'activité solaire et les perturbations de la déclinaison magnétique enregistrées à Saint-Genis-Laval (Relation between Solar Activity and the Disturbances of Magnetic Declination Registered at Saint-Genis-Laval). Ann. Géophys., Paris, vol. 1, No. 3, 1945, pp. 264-274.

Statistical analysis of magnetic and solar observations shows that a correlation of +0.58 exists between the annual averages of the amplitude of the variation of declination and the relative index numbers of Wolf-Wolfer; with the increase of solar activity, the correlation reaches +0.76, and with the decrease it declines to +0.45. As usual, the monthly averages of amplitude show the well-known maxima of February-March and October; but such maxima become more pronounced during years of increased solar activity. These results are based upon observations made during 50 years and are in agreement with the findings of Kostizin at Parc Saint-Maur.

The totality of the evidence seems to fit into the hypothesis that magnetic disturbances are caused by rays emitted by the parts of the sun adjacent to sun spots. Supporting considerations and examples are given. - V. S.

8663. Eckhardt, E. A. Airborne Magnetometer. Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 5, 1946, pp. 78-79, 91-92.

The airborne magnetometer of the Gulf Research & Development Co. is an adaptation of the saturated-core magnetometer of V. Vacquier having no movable parts affected by acceleration (Geoph. Abs. 122, No. 8083). The war brought about an application of this magnetometer to several military purposes, among them the detection of submarines from the air. Eventually, the airborne magnetometer was adapted to exploration for mineral deposits, and successful test-surveys were made over extensive areas containing oil and iron.

In its final form, the Gulf airborne unit for magnetic exploration is equipped with devices for high sensitivity, automatic orientation-stabilization, elimination of irrelevant influences, continuous recording of measurement, and registration of ground trace by photography or radar. It can operate from a wide range of altitudes and at different flight velocities, possesses a sensitivity of over 1 gamma, permits the surveying of water-covered and other inaccessible terrain, increases the speed of the work, and reduces the cost of exploration. The various instruments composing the apparatus are described. - V. S.

8664. Howe, H. H. Magnetic Observatory Results at College, Near Fairbanks, Alaska, for the Second Polar Year, October 1932 to March 1934. U. S. Coast and Geodetic Survey, Washington, D. C., MO-21, 1944, 179 pp.

This publication contains extensive tables of observatory results, reproductions of magnetograms showing the more important magnetic storms, and an explanatory text. The tabulated results include hourly mean values of the magnetic elements D, H, and Z, summaries of their monthly and annual means, collected mean diurnal variations for each month, season, and year, lists of principal magnetic disturbances, amounts of noncyclic change, observed and adopted base-line values of the D, H, and Z variometers with their abrupt changes, etc. The text furnishes a description of instruments, discussions of their coefficients and behavior and of the procedures used, and explanations of the various tables. - Author's abs.

8665. International Nickel Co. of Canada, R. C. Rowe, ed. The Operations and Plants of the International Nickel Company. Canadian Min. Jour., Gardenville, Que., vol. 67, No. 5, 1946, pp. 309-554.

This report includes a brief statement on the field procedures used by the International Nickel Co. in its detailed magnetic surveys for metals. The Askania magnetometer and the Hotchkiss Superdip serve for measurements. Base lines are run about 2,000 feet apart and parallel to the long axis of the area explored, with readings taken at intervals of 200 feet, and cross lines are run between the base lines with readings taken at intervals of 100 feet. A grid is thus produced on centers of 100 by 200 feet. The instruments are checked at each crossing of the base lines. - V. S.

8666. Keller, Fred, Jr. The Magnetic Work of the U. S. Coast and Geodetic Survey at Parícutin Volcano, Michoacan, Mexico, 1945. Trans. Am. Geophys. Union, Washington, D. C., vol. 27, No. 3, 1946, pp. 350-363.

The geomagnetic field in the vicinity of Parícutin was investigated to ascertain whether the development of a volcano produces deep-seated magnetic

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changes. The method consisted in measuring vertical intensity at proximate and remote stations and determining whether the difference between these measurements changed with time. The instruments included an Askania vertical-intensity field balance, a continuously recording magnetograph, a Coast and Geodetic Survey absolute magnetometer, and three seismographs; a base station served for checks.

The differences observed with time between the measurements taken are plotted in curves. The results show that the variation of vertical intensity at the proximate stations is much larger than the variation at the distant stations. The magnitude and distribution of these variations indicates that a slight warping of the magnetic field is taking place about Parícutin, the change being most pronounced to the north of the volcano. - V. S.

8667. Koulomzine, F. Application of Geophysical Prospecting to the Pre-Cambrian Shield. Canadian Min. Jour., Gardenvale, Que., vol. 67, No. 10, 1946, pp. 933-940; also Western Miner, Vancouver, B. C., vol. 19, No. 7, 1946, pp. 37-39.

The pre-Cambrian Shield that yields most of Canadian mineral production is largely covered by an overburden of sand, clay, and boulders 10 to 300 feet thick. Accordingly, the principal means of exploration are diamond drilling and geophysical prospecting, the magnetic and electrical methods being the most suitable. The author discusses the magnetic investigations, choosing typical examples among the 140 surveys conducted by the firm of Koulomzine, Geoffroy, Brossard & Co. during the last 10 years.

The Bourlamaque survey revealed a large and complex intrusive mass that contained ore and gold deposits. The Vassan survey detected an intrusive mass under Lake Demontigny that carried gold-bearing intersections. The Malartic survey disclosed folding and faults bearing ore intersections. Finally, the Quemont survey led to the discovery of ore under Lake Osisko. The general conclusion drawn from this work is the cardinal dependence of geophysical exploration on geology, without which no results could have been obtained. - V. S.

8668. Kutscher, Fritz. Erdmagnetische Messungen auf Magnetitlagerstätten im südlichen Riesengebirge (Geomagnetic Measurements of Magnetite Deposits in Southern Riesengebirge). Ztschr. prakt. Geol., Halle, vol. 49, No. 4, 1941, pp. 39-45.

In 1940, magnetic surveys were made of a series of magnetite deposits in the southern Riesengebirge, Czechoslovakia. The local geology is described. Generally, these magnetites are strongly magnetic and embedded in magnetically weaker formations; e.g., phyllite 90 x 10^{-6}, amphibolite 10 x 10^{-6} to 9,000 x 10^{-6}, according to magnetite content, and magnetic iron 0.1 to 1.6. The measurements were made of vertical magnetic intensity with the Askania balance; the field procedures and calculations developed by H. Reich were adopted, with particular emphasis upon a close network; isoanomaly maps were plotted.

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The results of the surveys near Hackelsdorf, Gross-Aupa, Ober-Kleinaupa, and Petzer are described and illustrated by isoanomaly charts and ΔZ profiles. They reveal a number of pronounced anomalies. - V. S.

8669.Maree, B. D. Notes on Some Magnetometric Surveys, with Special Reference to Anomalies on Karroo Dolerites. Trans. Geol. Soc. South Africa 1943, Johannesburg, vol. 46, 1944, pp. 107-118.

The magnetometric anomalies obtained on Karroo dolerites and the interpretation of these anomalies are described. The use of the magnetometer for the selection of sites for water boreholes on granites is discussed, with additional reference to the delineation of a Karroo basin underlain by Bushveld granite. - Author's abs.

8670.Muffly, Gary. The Airborne Magnetometer. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 321-334.

This paper discusses the problem of magnetic exploration for oil from an aircraft. A new type of saturation magnetometer is described. Various orientation and stabilization schemes and their application to submarine detection and geophysical prospecting are discussed. It is shown that total-field measurement is far superior to vertical-component measurement. The newest Gulf apparatus using an automatically stabilized, continuously recording total-field magnetometer is described. - Author's abs.

Nikiforov, N. A. Geophysical Methods as Means of Detecting and Studying Gold Deposits (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 4, 1945, pp. 389-398. (See abs. 8710 in this issue)

8671.Obruchev, V. A., and Grigoriev, D. P. Native Magnetic Gold. Compt. rend. (Doklady) Acad. Sci. URSS, Moscow, vol. 46, 1945, pp. 290-292.

Small, dull flakes of gold from Yakutsk district, USSR, are magnetic with polarity, the susceptibility $\chi = 0.040$ C.G.S. μ_0 being between that of pyrrhotine and ilmenite. Analysis by K. A. Nenadkevich gave Au 78.24, Ag 17.23, Fe 4.4 percent. This composition falls on the boundary of the $AuFe_3$ field in the system Au-Fe. - L.J.S., Mineral Mag., London, vol. 27, No. 193, 1946, Abstracts, p. 258.

8672.Seeley, S. W. Shoran Precision Radar. Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 9, 1946, pp. 74-75.

Shoran radar serves for high-precision position finding in aerial navigation and mapping; the name stands for short range, up to 250 miles. The research was initiated by the Radio Corporation of America in 1938 and was taken over by the United States Army and Navy during the war. Military tests of geological application gave a "first order survey accuracy" of about 1 foot in 5 miles.

The method of determining position in flying consists of triangulation by means of radar waves. Two ground stations with a known distance between them are needed. The plane crew sends out pulses to each station and receives them back, measuring the round-trip time for determining the distance from both points. The equipment on the plane comprises a transmitter, a receiver, a pulse-timing unit, a Veeder counter, and accessory instruments. Each ground stations has a receiver-monitor, transmitter, power generator, antenna arrays, etc.; this equipment is air-transportable and can be installed in 90 minutes. The operation of the various apparatus is described. Flight techniques differ with the problems; several planes can operate from the same two or more ground stations. Usually, the base line connecting the stations is crossed back and forth, or circular arcs are flown around one of the stations. - V. S.

8673. Skillings' Mining Review. Employ Helicopter for First Time to Explore Remote Mining Regions. Duluth, Minn., vol. 35, No. 12, 1946, p. 1. Also, Montana Oil Jour., Great Falls, Mont., vol. 26, No. 18, 1946, p. 8.

An expedition headed by H. Lundberg is making extensive tests of magnetic surveying with a helicopter over mineral areas in Sudbury, Ontario. The Bell Aircraft Corp. of Buffalo has placed at its disposal a Model 47 couple-type helicopter, pilots, technicians, and accessories. The craft satisfies the requirements of minimum vibration, variable speed, maneuverability, motionless floating, and easy take-off and alighting. It is equipped with magnetic instruments developed by Lundberg, which are reported to be capable of surpassing the airplane-borne magnetometer of the United States Navy; their nature has not been revealed. In airplane surveys, correlation of magnetic readings with points on the ground is handicapped by fast motion, whereas the helicopter makes it possible to maneuver back and forth, up and down over an anomaly until the exact place registering the largest deviation is determined. It is proposed to extend the tests to remote regions of northern Canada. - V. S.

8674. V'iunov, B. F. The Role of Meteoric Streams in the Generation of Magnetic Storms and Aurora Borealis (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 4, 1945, pp. 294-315.

The study of magnetic storms and aurora points to their partial dependence upon the fall of meteorites on the earth. The author has analyzed the data gathered on 1,103 magnetic storms and 512 auroras during several decades of observation and found that periods of a denser streaming of meteorites coincide with periods of greatest magnetic disturbance and auroral frequency; the earth apparently crosses the meteoric streams in March, September, and October. However, the fall of meteorites is not the only factor related to magnetic storms and aurora. The total complex of inter-related phenomena includes such other factors as sun spots, ionosphere disturbances, and meteorological conditions. - V. S.

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3. SEISMIC METHODS

8675. Berson, I. S. Spatial Problem of the Interpretation of Hodographs of Refracted Waves: One Plane Contact-Boundary (abs., in Russian). Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-1944, Moscow, 1945, p. 115.

The interpretation of hodographs of refracted waves currently is being expanded to include three-dimensional cases. In this development, the first problem is the simplest case of a plane contact-boundary. This is here examined in application to penetrating and nonpenetrating waves encountering a single horizontal contact-surface. Diagnostic indications are given on systems of hodographs allowing a unique interpretative solution, and methods are offered for their calculation. Consideration also is devoted to the interpretation of transverse hodographs and to methods of finding definite solutions for them. (To be published in Trans. Inst. Theor. Geophys., Moscow). - V. S.

8676. Berson, I. S. Hodographs of Reflected Waves and their Interpretation by Means of the Horizontal Gradient of Velocity (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 1, 1945, pp. 21-35.

In the interpretation of hodographs of reflected waves, a failure to take the horizontal gradient of velocity into account may lead to grave errors. Such gradient is best determined by means of a seismic coring of boreholes in the explored area. It may also be estimated by interpreting certain aspects of velocity in hodographs commensurable in their length with the depth of the reflecting horizon. The equation of a hodograph is deduced for the case of one horizontal contact-surface and a horizontal, linear change of velocity. An analysis also is made of the distortions produced in the actual shape of the reflecting boundaries by the assumption of an average constant velocity in the interpretation.

As the value of the angle of such distortions increases with an increase in the horizontal gradient of velocity and the depth of the reflecting boundary, seismic reflection is virtually inapplicable to the exploration of deep, inclined formations when the horizontal gradient is unknown. For the case when it is known, a method of approximate interpretation of hodographs is offered for determining the depth and shape of the reflecting boundary. - V. S.

8677. Boyer, G. L., Jr., and Shepard, Ward, Jr. A Recording Six-Trace Cathode-Ray Oscillograph (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 98.

A portable, general-purpose, six-trace, cathode-ray oscillograph is described. Eight 2-inch cathode-ray tubes are arranged side by side in a line. Six of these tubes have individual d. c. amplifiers, which have high-gain, high-input impedance, good high-frequency response, and excellent stability. The two outside cathode-ray tubes give calibrated timing pulses.

A built-in camera with a fast lens photographs the cathode-ray tubes on standard 35-mm. film to give a continuous time-displacement record of the cathode ray spots. The film may be driven past the lens aperture at speeds continously variable from a few inches per second to 15 feet per second. A 100-foot film-supply system can be used, or a 10-inch strip can be fastened around the drive drum for short records.

Film can be processed rapidly and examined readily with a viewer having a 5- to 10-diameter magnification. More complete analysis of records can be made from enlargements. - Authors' abs.

Coulomb, Jean. Séismes profonds et grandes anomalies négatives de la pesanteur peuvent-ils être attribués à une extension plastique? (Can Deep-Seated Seismic Activity and Large Negative Anomalies of Gravity be Attributed to a Plastic Expansion of the Earth?). Ann. Géophys., Paris, vol. 1, No. 3, 1945, pp. 244-255. (See abs. 8647 in this issue.)

8678. Gamburtsev, G. A. On the Significance and Interpretation of Transverse Profiles in Exploration by Seismic Reflection (abs., in Russian). Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, pp. 120-121.

In exploration by seismic reflection, transverse profiles can serve as a very precise means of detecting the smallest inclination of reflecting horizons. Accordingly, an analysis is made of some of the distinctive features of observation over such profiles, and formulae are given for interpreting the hodographs obtained. The form of these formulae is found to coincide with that of the formulae for the interpretation of hodographs of refracted waves. Such identity leads to the conclusion that the inclination of seismic horizons can be determined in a number of cases even when it is uncertain whether the records used were made of refracted or reflected waves. (Inst. Theor. Geophys., Moscow.) - Transl. by V. S.

8679. Gamburtsev, G. A. Methods of Interpreting Isochrone Maps of Refracted Waves (in Russian). Compt. rend. (Doklady) Acad. Sci. URSS, Moscow, vol. 44, No. 7, 1944, pp. 274-276.

The development of the correlation-refraction method and its application in areal surveys by means of the isochrone technique pose problems of the spatial interpretation of refraction isochrone maps. A particular case is analyzed when the velocities of elastic waves in each layer are constant and known, and when the wave fronts in the lower refracting layer can be considered vertical. This three-dimensional problem is reduced to a combination of simple two-dimensional questions solved by the method of time fields. The distinctive feature of the solutions consists in analyzing cross sections of the time fields and their horizontal projections rather than the total time field in its entirety. The solution is given in a form convenient for practical application. - V. S.

8680. Gane, P. G., Hales, A. L., and Oliver, H. A. A Seismic Investigation of the Witwatersrand Earth Tremors. Bull. Seismol. Soc. Amer., Berkeley, Calif. vol. 36, No. 2, 1946, pp. 49-80.

The results are presented of an investigation of the foci of Witwatersrand earth tremors by means of five small, mechanical seismographs. Timing accuracy of about 0.05 second was obtained by the use of synchronous electric clocks at each station, the time marks from which were correlated daily by means of radio time signals. The instruments are described, and an account of the locating procedure is given. The average velocities for the area were found to be $V_p = 5.40 \pm 0.07$ km/sec., $V_s = 3.19 \pm 0.03$ km/sec. The energy in a large tremor was estimated to be of the order of 10^{18} ergs. - Authors' abs.

8681. Gilmore, M. H. Microseisms and Ocean Storms. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 36, No. 2, 1946, pp. 89-120.

A direct relationship is found to exist between microseisms and low barometric pressure characterizing storms. In the past, investigations were made in India, Germany, and the United States. During World War II, the United States Navy conducted research on the use of microseisms for locating and tracking severe, far-distant hurricanes.

The first naval station for microseismic detection of hurricanes was established on Cuba in 1944. It employed the tripartite method of observation which determines the direction of disturbance and microseismic amplitudes by measuring time intervals between wave arrivals at three vaults disposed triangularly. The data indicated a high degree of correlation between microseismic activity and intense storms, as well as satisfactory localization of the activity. In 1945 two more tripartite stations were added, in Puerto Rico and Florida, for checks by triangulation. The results are discussed and illustrated by graphs of storm tracks, microseismic amplitudes, and travel-time curves; the formulae for the determination of the direction of arrival of microseisms at a tripartite seismograph station are given. B. Gutenberg, adviser to the Navy Department, reported that the correlation between microseisms and storms appears convincing. - V. S.

8682. Gilmore, M. H. Microseisms Classified According to Type of Storms. Trans. Amer. Geophys. Union, Washington, D. C., vol. 27, No. 4, 1946, pp. 466-473.

The purpose of this paper is to present certain technical details involved in a proper interpretation of dominant microseisms recorded in the Caribbean. Twelve figures are given that show microseisms produced by hurricanes, cold fronts, thunderstorms, fair weather and artificial vibrations. These are classified and listed in a table according to type, period, amplitude, form, and duration. - Author's abs.

8683. Green, C. K. Seismic Sea Wave of April 1, 1946, as Recorded on Tide Gages. Trans. Amer. Geophys. Union, vol. 27, No. 4, 1946, pp. 490-500.

Records from some 20 tide stations in the eastern Pacific Ocean, covering a belt from 57° N. latitude to 33° S. latitude, which show the onset of the seismic sea wave of April 1, 1946, are analyzed. Travel-time curves computed from the formula $V = \sqrt{gd}$ are shown to be in good agreement with the observed times of arrival of the seismic sea wave. The average ratio of initial rise to succeeding fall of the water is found to be one to three, which may account for the frequent mention of an initial recession by eyewitnesses. The first half period is derived as a measure of the period of the seismic sea wave, which is found to average 15.6 minutes. The period for the nearer stations averages 15.0 minutes, whereas for the farther stations it averages 17.4 minutes. - Author's abs.

8684. Heinrich, R. R. Northeastern Ozark Earthquakes. Trans. Amer. Geophys. Union, Washington, D. C., vol. 27, No. 3, 1946, pp. 320-323.

In recent years, instrumentally determined epicenters of five earthquakes have been located on the northeastern flank of the Ozark uplift. The local distribution of these epicenters shows (1) the dangers of considering northeastern Ozark seismic activity as arising from geographically delineated seismic districts, and (2) the importance of discussing the earthquakes in relation to the zone of faults and flexures that lies between the Ozark dome and other major tectonic features to the north and east.

Interesting structural features are found in the vicinity of the epicenters of individual earthquakes. The epicenters were situated (1) on the limb of the Eureka, Mo., anticline, (2) adjacent to the faulted Waterloo-Dupo, Ill., anticline, (3) in the Ste. Genevieve, Mo., fault zone, (4) in the vicinity of the Moselle, Mo., fault, and (5) in the large faulted block southwest of the magnetic high near Bourbon, Mo. Depth of foci of at least 5 miles is indicated by the distribution of intensities and the character of the seismograms. In this connection, the possible shielding effect of the Ozark core invites further study. - Author's abs.

8685. Hoylman, H. W. Seismograph Evidence on Depth of Salt Column, Moss Bluff Dome, Texas. Geophysics, Menasha, Wisconsin, vol. 11, No. 2, 1946, pp. 128-134.

Clear reflections, at times of approximately 2.3 and 4.4 seconds, were obtained consistently on a series of records shot directly over the shallow cap rock of the Moss Bluff dome. The earlier reflection can be interpreted as from the base of the salt column, at a depth of around 16,000 feet, or from a discontinuity within the salt column. The later reflection can be interpreted as from the base of the salt column at around 36,000 feet, from the basement complex at around 26,000 feet, or as a multiple of the reflection from the base of the salt column at around 16,000 feet. Reasons are given for preferring the multiple reflection interpretation. - Author's abs.

8686. Inglada, Vincente. Tabelle degli intervalli ($t_{pP} - t_P$) e ($t_{sS} - t_S$) per l'analisi dei terremoti ad ipocentro profondo (Tables of the Intervals $t_{pP} - t_P$ and $t_{sS} - t_S$ for the Analysis of Earthquakes with a Deep Focus). Geofis. Pura & Appl., Milan, vol. 3, No. 4, 1941, pp. 189-193.

The author has calculated the values of the interval ($t_{pP} - t_P$) to the second decimal of a second, using a formula of Berlage. The tabulated resul cover earthquakes of a depth of 50 to 800 km. with a focal distance of 200 t 11,400 km.; the data of Gutenberg and Richter served for the computation of r/v and $1/V$. In order to obtain the values of the interval ($t_{sS} - t_S$), the figures calculated for ($t_{pP} - t_P$) were multiplied by 1.80. The tables are given. - Author's abs., translated by V. S.

8687. Ives, G. O. Colombia Exploratory Activity. Oil Weekly, Houston, Tex., vol. 122, No. 10, 1946, Intern. Sec., pp. 12-15.

Colombia is undergoing extensive exploration by seven oil companies and appears to be entering its period of greatest oil search. Most of the new drilling is based upon geophysical exploration made chiefly by seismic reflection; there were some refraction surveys also. The work centers in various parts of the country, such as the middle ranges of the Magdalena River, Bolivar, etc. Geophysical exploration is very expensive, varying considerably with the localities; to keep a seismic crew operating costs from $50,000 a month upward. - V. S.

8688. Jones, W. M. The Seismic Geometry of a Volcano Such as Ruapehu. New Zealand Jour. Sci. & Tech., Wellington, N. Z., vol. 27B, No. 4, 1946, pp. 317-329.

For a volcano of the size of Ruapehu, the problem of locating the foci of seismic disturbances is discussed. A group of hypothetical stations is used to consider the geometrical principles involved, the layout of stations for particular methods, and the bearings of instrumental performance and initial assumptions on the accuracy attainable. Remarks are made also on the problem of early location of incipient activity of the thermal region. - Author's abs.

8689. Kintz, G. M. Informal Discussion of Explosives Hazards on Seismograph Crews. Geophysics, Menasha, Wisconsin, vol. 11, No. 2, 1946, pp. 148-163.

This paper sets forth the need for standard instructions in the safe handling and use of explosives in the geophysical industry. It suggests the appointment of an agency, such as the Bureau of Mines, to collect data regarding accidents and near accidents in which explosives were involved, the agency also to analyze the data that are submitted, and to compile from the data a standard set of instructions. Several accidents that occurred while explosives were being used by the geophysical industry, and which were reported to the Bureau of Mines during the last 3 years, are discussed and analyzed.

Although the accidents considered were not all of the accidents that occurred, they cost the industry over $235,000 and the lives of 5 men in addition to permanent injuries to several members of the geophysical crews. The author believes that if a standardized set of instructions were compiled and used, most of the explosives accidents could be prevented. Moreover, these instructions would improve the efficiency of crews when the men are shifted or new men are employed. - Author's abs.

8690. Kirnos, D. P., et al. The Bokhara Seismological Expedition (abs., in Russian). Akad. Nauk SSSR, Otd. Fis.-Mat., Referaty za 1943-44, Moscow, 1945, p. 121.

In 1942/43, a seismological expedition made surveys in Bokhara, USSR, to test the local sediments for oil, particularly the Khadzhi-Kab incline. The seismic method of reflection was used, including application of transverse profiles developed during the work. In the interpretation, both the first and the subsequent arrivals were considered, the latter being correlated according to the qualitative features of vibratory patterns.

The results have given indications on the number of reflecting horizons, the values of velocity in different rocks, the characteristics of propagation in stratified media, etc. They have been confirmed by boring and plotted in structural maps. The delineation of the Khadzhi-Kab incline showed that the previously determined gravitational maximum is removed by 300 to 400 meters from the local dome. (Seismol. Inst., Moscow.) - V. S.

8691. Kölbel, H., Schnell, H., and Trappe, F. Seismische Untersuchungen im Helmstedter Braunkohlenrevier (Seismic Surveys in the Brown-Coal District of Helmstedt). Jahrb. d. Reichsamts für Bodenforsch., 1942, Berlin, vol. 63, 1944, pp. 550-556.

The seismic method can be used to map soft-coal mining operations. A survey was made in the Helmstedt-Supplingen region, Germany, to clarify the Tertiary tectonics of the Helmstedt coal field; the local geology is described. The refraction method served for exploration because the depth required did not exceed several hundred meters. The work was carried out by means of explosions from depths of 15 to 20 meters registered by 6 electric seismographs separated by 25 to 100 meters; 700 seismograms were obtained from 23 shotholes over two main profiles and several transverse profiles. The results confirmed the existence and delineated the contours of an anticipated salt dome westward from Helmstedt. It was found to be an upthrust linking trough sections of the coal-bearing Tertiary Basin. A geological profile is presented. - V. S.

8692. Kosminskaia, I. P. On the Initial Points of Hodographs of Mintrop Waves (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 10, No. 1, 1946, pp. 91-100.

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In 1917, L. Mintrop offered a method of prospecting utilizing the first arrivals of seismic waves propagated at a critical angle $i = \text{arc Sin} \frac{V_1}{V_2}$, the values V_1 and V_2 being velocities in two different media; a drawing gives the relationship between direct, reflected, and Mintrop waves (top waves). The existence of Mintrop waves was later confirmed by numerous field experiments in different countries and by the laboratory tests of O. Schmidt (See Geoph. Abs. 98, No. 5061).

In 1944, Mintrop waves were studied in the course of surveys by the correlation refraction method carried out by the Institute of Theoretical Physics in the Baku region, USSR. The experimental observations are described, with illustration of seismograms of reflected and Mintrop waves. Consideration is given to reconciling these data with existing theories, and to a mathematical determination of average velocity in the covering medium in terms of the coordinates of the initial points of hodographs of Mintrop waves. The errors of such determinations are analyzed. - V. S.

8693. Leet, L. D. Earth Motion From the Atomic Bomb Test. Am. Scientist, New Haven, Conn., vol. 34, No. 2, 1946, pp. 198-211.

Conditions at the test of the atomic bomb in New Mexico on July 16, 1945, have for the first time duplicated experimentally (at a proper energy level) the problem of Lamb in 1904. At that time, he solved equations of elasticity to predict ground motion at a place distant from the point where a vertical impact is applied to the ground. In New Mexico, ground motion was recorded on a damped three-element seismograph with oriented horizontal components. Results differed widely and significantly from prediction. One previously reported wave type, the coupled, not predicted by theory, carried an appreciable portion of the energy in the ground waves. Another, the hydrodynamic, had not been reported or predicted before. It produced the greatest displacements on the record. Longitudinal, transverse body, Rayleigh, and surface shear waves were also identified.

This record represents the most important single advance to date toward the solution of the seismological problem of establishing observationally the types of waves which earth materials in place will support, one of the basic problems in the science. - Author's abs.

8694. Macelwane, J. B. The Problem of Microseisms and Ocean Storms. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 36, No. 2, 1946, pp. 81-82.

The author outlines the problems and origins of the microseismic research on ocean storms conducted by the United States Navy during the war. Generally, microseisms comprise all the various types of waves recorded by seismographs and not due to earthquakes. In investigations of ocean storms, only the group microseisms appearing as a sequence of groupings of regular waves of four to six seconds period, with short intervals of slight motion, are important. Statistical and temporal correlation studies had pointed to three possible explanations of such microseisms during ocean storms; namely, they could originate in the surf on rockbound coasts, or in certain types of frontal disturbances anywhere on land and sea, or else at the center of storms at sea.

The last named explanation was supported by the experimental evidence of J. E. Ramirez in 1939-40, obtained by means of one tripartite recording station with specially designed seismographs suggested by J. B. Macelwane. During the war, the United States Navy made tests in the Caribbean to duplicate the results of Ramirez and to experiment with more than one tripartite station. - V. S.

8695.Martin, Rodrigo. Variaciones laterales de velocidad en la prospeccion sismografica (Lateral Variations of Velocity in Seismographic Prospecting). Bol. Inform. Petrol. (Y.P.F.), Buenos Aires, vol. 22, No. 256, 1945, pp. 444-449.

The application of seismic reflection to exploration for oil is explained briefly. Attention is then centered on the determination of velocities in the deep subsurface layers. The main difficulty here arises from the uncertainty of lateral velocity, which may not be constant. A method making it possible to attribute the most probable velocity values to the horizons investigated is discussed in terms of the data of a seismic survey made near the confluence of the rivers Neuguch and Limay, Argentina. The variation of velocity in this locality was so large that it produced a difference of 130 meters in the determinations of the reflecting horizon at three adjacent stations at depths of the order of 1,300 meters. The solution is worked out by means of a map of isocorrections. - V. S.

Nettleton, L. L. Geophysical History of Typical Mississippi Salt Domes (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 98. (See abs. 8655 in this issue.)

8696.Perri, Emilio. Di un nuovo accelerometro e relativo metodo di lettura differenziale per la determinazione rapida delle forze sismiche massimali (Concerning a New Accelerometer and the Related Method of Differential Readings for a Rapid Determination of Maximum Seismic Force). Geofis. Pura & Appl., Milan, vol. 3, No. 1, 1941, pp. 1 - 11.

The author's new accelerometer for seismic determinations is described briefly with regard to construction and theory. It is based upon the pendulum principle and includes a subsidiary apparatus of the frequency-meter type for ascertaining the period of seismic vibrations (see Geoph. Abs. 101, No. 5498). The instrument can be used for determining maximum seismic force by means of a method of direct and rapid differential measurements. Acceleration is read simultaneously on two accelerometers having nearly the same sensitivity but a different pendulum period. The method is explained, and the underlying principles are demonstrated by mathematical discourse. The precision of measurements is found to approximate 5 percent. - V. S.

8697.Reed, Paul. Socony-Vacuum Explores Barinas, Venezuela's Largest Concession. Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 14, 1946, pp. 62-63.

Early in 1946, five seismograph parties and one gravimeter party made surveys in the Barinas, Apure, and Tachira concessions of the Socony-Vacuum Oil Co. in Venezuela, which comprise in all 3,339,700 acres. The principal work centered in Barina, Venezuela's largest and least accessible concession; continuous reflection prospecting was done in the vicinity of Yaure. So far, three initial wells have been drilled to depths of 7,000 to 10,000 feet, all dry. Very little geological information is available. Most of the seepages in Barinas seem identified with Eocene formations; the original sources of oil are not known. - V. S.

8698. Riznichenko, Iu. V. On the Relationship Between Layer Velocities, Boundary Velocities, and Average Velocities (abs., in Russian). Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, p. 124.

In seismic exploration, the basic physical characteristic serving for determining the configuration of geological media is the velocity of propagation of elastic waves. However, measurements yield not the actual value of velocity at any point but certain average values. Such are, particularly, the average velocity of a vertical ray passing between the given depth and the surface and usually employed in the case of horizontal stratification, or else the layer velocity which is the averaged value of the actual velocities that is assigned to the depth zone investigated.

The author determines the mathematical relationships existing between some of the average values employed; namely, between the average velocity, the layer velocity, and the boundary velocity. The latter is the value ascertained by means of hodograph interpretation. The results are discussed, and graphic methods are evolved for determining layer velocities from the data of seismic coring or reflection measurements. (Inst. Theor. Geophys., Moscow.) - Transl. by V. S.

8699. Riznichenko, Iu. V. Contribution to the Development of the Theory of Borehole Seismographs (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 1, 1945, pp. 11-20.

Mathematical solutions are sought for the direct and reversed problems of seismic prospecting in boreholes. Consideration is given to penetrating and nonpenetrating refracted waves and to Mintrop waves (top waves). The method consists in calculating the relationships between the apparent velocities measured along the borehole axis above and below the investigated horizon as functions of several shot points on the surface.

The formulae deduced make it possible to express the theoretical alternatives for these relationships in the form of diagrams. These can be used for the solution of problems of interpretation by plotting also the empirical data in the form of special diagrams and comparing them with the theoretical diagrams; such a solution is applicable in more problems of interpretation then the solution of A. Datskevich. The theoretical diagrams also may serve for dealing with a number of methodological problems, such as distribution of shot points, compilation of data, determination of errors, etc. - V. S.

8700. Scholte, J. G. On the Stoneley-Wave Equation. Proc. Nederl. Akad. Wet., Amsterdam, vol. 45, No. 2, 1942, pp. 159-164.

The Stoneley wave system can be derived by extending the calculations of Knott relating to the reflection of elastic waves at the surface of separation between two infinite media. The corresponding wave equation is not always solvable, as has been pointed out by Stonely. In the present paper it is shown for what values of the material constants (γ_2/γ_1 and μ_2/μ_1) the equation can be solved. - Author's abs.

8701. Sieberg, August. Processi meccanici nella distruzione degli edifici per azione sismiche (Mechanical Processes in the Destruction of Buildings by Seismic Action). Geofis. Pura & Appl., Milan, vol. 3, No. 3, 1941, pp. 125-141.

It is increasingly believed that earthquake damage to buildings should be studied in terms of seismic action on their foundation and the resulting mechanical processes of destruction. The author has continued such experiments at the Deutsche Reichsanstalt für Erdbebenforschung, Jena (Geoph. Abs. 95, No. 4650). His method, confirmed by observations of actual earthquakes, consisted in subjecting to controlled shocks various models of buildings placed on special platforms resembling shaking tables, while taking records of seismic vibrations and photographing the destruction on moving films. In presenting his results, he discusses the observed deformations and damages, distribution of stress, effects of various types of foundation, and shock-resisting construction. Reproductions of films of the destruction of models illustrate the text. - V. S.

8702. Sprengnether, W. F., Jr. A Description of the Instruments Used to Record Microseisms for the Purpose of Detecting and Tracking Hurricanes. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 36, No. 2, 1946, pp. 83-87.

A horizontal-component seismometer was designed by the Sprengnether Co. for experiments in detecting and tracking hurricanes conducted by the United States Navy during the war. It bears the characteristics of the Macelwane-Sprengnether instrument, with simplified controls and adjustments. Construction consists essentially of three elements - the boom assembly, the coil magnetic unit, and the damping magnetic unit. The maximum synchronous magnification for operating at a period of 6 seconds is about 2,500.

A three-component recorder of the drum type is provided for identical time marks essential in meteorological problems. To avoid confusing overlaps of closely spaced microseism lines of high amplitude, a line-spacing lead screw can be rotated by a motor drive in a direction opposite that of the drum, causing the drum to progress faster along its axis. As a result, it is possible to separate the lines by any required space. The different parts of the seismometer are described and illustrated by photographs. - V. S.

8703. Taylor, J., Morris, G., and Richards, T. The Effect of Velocity of Detonation on the Efficiency of Explosives Used in Seismic Prospecting. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 350-361.

Field tests have shown that no significant difference in amplitude or frequency of the first arrivals of refracted waves at distances of 6,000 to 20,000 feet is found from explosives having velocities of detonation in the range 7,500 to 1,100 metres per second or powers from 61- to 85-percent blasting gelatine. When a deflagrating explosive was employed, there was only a very small decrease in the amplitude of the refracted wave. - Authors' abs.

8704. Wolf, Alfred. Motion of an Elastic Sphere in an Acoustic Wave Field in Fluids. Geophysics, Menasha, Wisconsin, vol. 11, No. 2, 1946, pp. 178-182.

The motion of an elastic sphere in an acoustic wave field in fluids is determined as function of the elastic constants of the sphere, its radius, and the frequency of the wave field. It is found that the motion differs but little from the motion of an infinitely rigid sphere when the wave length of transverse waves in the elastic sphere is at least as long as the circumference of the sphere. The coefficient of zero order scattering potential in the fluid is determined. - Author's abs.

4. ELECTRICAL METHODS

8705. Aerial, Geological, and Geophysical Survey of Northern Australia. Geophysical Survey of Redbank Copper Field, Northern Territory. Report for period ended 31 December, 1940, Canberra, 1942, pp. 60-63.

This field is situated 14 miles west of the Queensland border and 50 miles south of the Gulf of Carpentaria. Potential ratio, electromagnetic, self potential, and magnetic surveys were conducted, and the potential ratio and magnetic methods proved to be the most useful. With the exception of the Azurite and possibly the Redbank lode, the results did not serve to indicate the possible limits of the lodes. The results obtained at the Redbank mine suggest that the lode is of limited length and does not extend far beyond the line of the present working. The Azurite lode appears to be associated with a 400-foot long, well-defined conductive zone which may be due to kaolinization. - Author's abs., Report, p. 8.

8706. Aerial, Geological, and Geophysical Survey of Northern Australia. Geophysical Survey of Croydon Goldfiel, Queensland. Report for period ended 31 December, 1940, Canberra, 1942, pp. 64-69.

This field is situated 85 miles to the east-southeast of Normanton on the Gulf of Carpentaria. The possible presence of a deep lead originating near the True Blue reef was investigated by the electrical depth-probe method. The results suggest that there is one buried valley near the True Blue reef and two valleys south thereof. Testing is deemed warranted in the deeper part of the valley near the True Blue reef in order to determine the gold content of the material in the bottom of the valley.

Potential ratio surveys were made in three places at the southeastern end of the field, in which detrital quartz suggested the presence of a quartz reef. In the Moonstone area an intense indication was obtained, and subsequent trenching exposed a narrow quartz vein containing high-grade gold ore in some places. - Author's abs., Report, p. 7.

8707. Anderson, D. M. Electrical Logging - An Aid to Wartime Production. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 11, No. 3, 1945, pp. 17-19.

In the Wilmington oil field of California, at present the second largest producer in the United States yielding 100,000 barrels a day, the accumulation and drainage of oil largely depend on an extensive fault system. To study its complex configuration, the Lane-Wells Co. has run 1,074 electrologs, covering all the wells of the field.

The results of correlation obtained for the wells on the south side of Terminal Island are discussed and shown on a cross section. Four main producing horizons are revealed in which faulting increases downward. Heavy vertical lines adjoining the logs indicate shales or wet sands that had been excluded from production by a cementing through perforations in multizone completions. It is pointed out that an accurate placing of these cemented intervals is possible only with the use of electrical logs. Other advantages are noted. In all, electrical logging in Wilmington field has shown faithfulness to detail, accurate indication of thickness and depth, and registration of all essential characteristics encountered. - V. S.

8708. Arlick, A. B. Electrical Potential of the Earth's Surface. Current Science, Bangalore, India, vol. 14, No. 6, 1945, p. 151.

The author examines the generally accepted assumptions that the electrical potential of the earth's surface is a fixed quantity and that the magnitude of this quantity is zero. Existing knowledge appears to contradict them both.

The strength of the core's field is of the order of 10^6 volts per centimeter, whereas the electric field that emerges at the earth's surface is merely a few volts per centimeter. This and other related facts show that there is an exceedingly steep difference of potential between the under and the upper surfaces of the crust. Therefore, the electrical potential of the earth's surface with respect to the core must be of a very high order of magnitude and not zero.

Furthermore, the strength of the terrestrial electric field within the earth's crust satisfies the relationship $y = f(?, x)$, whereas the electric potential of the earth's surface satisfies the relationship $\mathcal{P} = 2{,}900$ km. x $\int_0 f(Q)\,dx$, where Q is the earth's charge and x the height of a point on the earth's surface measured from the core's surface. Inasmuch as the value of Q varies directly as the terrestrial electric field, and the latter is known to change from time to time, the electrical potential of the earth's surface P with respect to the core cannot be a fixed quantity. On the contrary, it must vary over a wide range of values in direct proportion to the changing magnitude of the earth's field. - V. S.

8709. Broadhurst, E. Geophysical Prospecting at Moonta and Kadina. Chem. Eng. & Min. Rev., Melbourne, Australia, vol. 38, No. 450, 1946, pp. 197-203.

The areas about the abandoned Wallaroo-Moonta copper mines of South Australia have been surveyed for possible extensions of the exhausted deposits. The pre-Cambrian basement bearing minerals consists of mica-schists and quartzites with intrusions of felspar porphyry and is overlain by Cambrian, Tertiary, and recent deposits. Geophysical exploration of locations selected on geological indications was made in 1928 and in 1942 by electromagnetic method; a highly conductive sheet of clay covering the entire area to a depth of 10 feet and the high salinity of underground water rendered application uncertain. One of the areas also was surveyed magnetically.

The electromagnetic results gave strong indications of lode shear in several places, which are described. Magnetic results also showed a strong anomaly registering up to 6,000 gammas. However, the eight holes drilled revealed no copper ore. Apparently, the indications had been caused by shearing of felspar porphyry and barren quartz lodes. Further drilling is recommended. - V. S.

8710. Coates, G. E. The Principles of Electrolytic Corrosion of Metals. Chem. & Ind., London, No. 35, 1944, pp. 306-309.

A corroding metal may lose its negative charge in several ways: (1) By the discharge of positive ions in solution, commonly hydrogen ions, to form pure hydrogen, (2) by reaction with oxidizing agents forming negative ions, i.e., hydroxyl ions, or (3) by metallic conduction to another electrode at which the processes (1) or (2) may take place. The presence of air or oxygen accelerates the corrosion rate. If the dissolution of iron (the anodic process) and the reaction of electrons with oxygen (the cathodic process) occur at sites well separated, the corrosion product will be loose and no hindrance to further corrosion. If conditions are such that a closely adhering product forms, particularly over the anodic area, the corrosion rate may become very slow.

Over-voltage plays an important role in corrosion rate, i.e., cadmium dissolves very slowly in nonoxidizing acid because of the high hydrogen over-voltage. Hydrogen over-voltage is an important factor in corrosion of aluminum and magnesium. - Corrosion, vol. 1, No. 1, 1945, Abstracts, p. 20.

8711.Enslin, J. F. Basins of Decomposition in Igneous Rocks: Their Importance as Underground Water Reservoirs and Their Location by the Electrical Resistivity Method. Trans. Geol. Soc. South Africa, 1943, Johannesburg, vol. 46, 1944, pp. 1-12.

Most of the extractable underground water in igneous formations is stored in the decomposed rock. Basins of decomposition can be located by the electrical resistivity method, and borehole sites can be selected accordingly. The electrical resistivity instrument and method are described briefly, and their application is illustrated by a discussion of some actual surveys. In addition, some statistics concerning the boreholes drilled in igneous rocks in South Africa are given. - Author's abs.

8712.Gilbert, T. H., and Cornfield, Guy. The Behavior of Zinc-Iron Couples in Carbonate Soil. Corrosion, Houston, Tex., vol. 1, No. 4, 1945, pp. 187-191.

To determine the cathodic protection afforded to pipe lines, the U. S. Bureau of Standards installed zinc-iron couples at several underground test sites. The paper describes tests in the "highly carbonate" soil near Los Angeles. Each couple consisted of an iron ring connected to one or more zinc cylinders; the entire surfaces of the rings were in contact with the soil, whereas the cylinders, being covered by bottomless glass jars, touched the soil with their bases only. Electrode potentials and galvanic currents were measured periodically during 30 months.

The results indicated that the iron cathodes were not polarized; the current decreased toward the end of the tests; the potentials of iron, with respect to a copper-sulfate electrode, ranged between 0.35 and 0.79 volt, whereas those of zinc registered no appreciable change; differences in open-circuit potentials showed a rough correlation with humidity, with voltages increasing during the dry season; a coating generated on the zinc anodes reduced the current output; and none of the iron cathodes received adequate protection against corrosion. - V. S.

8713.Gilchrist, L., and Britton, J. W. An Improved Arrangement of the Single-Current Line Electrode Method of Geophysical Investigation (abs.), Trans. Roy. Soc. Canada, Ottawa, 3d ser., vol. 38, 1944, List and Minutes, p. 147.

This is a modification of the central line electrode method of exploration. It serves for distinguishing the anomalous resistivities at the surface and at depth more readily than by other electrical methods of exploration.

8714.Lee, F. W., and Hemberger, S. J. A Study of Fault Determinations by Geophysical Methods in the Fluorspar Areas of Western Kentucky. U. S. Bureau of Mines Report of Investigations 3889, June 1946, 27 pp.

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Electrical-resistivity surveys were made in the fluorspar mining areas near Marion, Kentucky, previously investigated geologically by S. Weller and others. The work was undertaken to determine the mines' mineral trends, particularly in relation to the fault patterns, and to compare the geophysical and geological results.

The report outlines the local geology, geophysical principles of fault detection, electrical resistivity methods with their applications and problems, and the results obtained geophysically and geologically. Consideration is devoted to the charting of fault anomalies, conditions modifying interpretation, comparisons of resistivity in different portions of the ground, resistivity differentiation of changes in homogeneity, separate resistivity functions in fault location, determination of average ground resistivity, study of topographic elevations, etc.

The results point to a substantial identity of geological and geophysical findings and to the advantages of preliminary geological information. They also reveal many additional fault locations, further complexities of structure in deeply-weathered zones, and more complete data on areas with minor faulting not detected geologically. Conclusions are drawn as to the character of mineralization.

As regards electrical resistivity methods, it is found that traverses should not be set farther apart than 200 feet, the 4-electrode system locates only the faults registering abrupt changes, a differentiation based upon asymmetry is very sensitive, and the local faulted area proves very diverse and complex electrically. Charting the results on profiles mounted on an areal map is recommended, and numerous profiles, maps, cross sections, and diagrams are presented. (A review appeared in Mining World, London, vol. 151, No. 3,936, 1946, p. 145.) - V. S.

8715. Mining Record, Denver, Colo. Fisher Research Using New M-Scope at Whitlock Mine. Vol. 56, No. 49, 1945, p. 3.

A geophysical survey of the Whitlock mine area, Mariposa County, California, leased to the Fisher Research Laboratory for experimental geophysical surveys with Fisher Laboratory instruments, is being conducted by Charles Dobbel, who employs a new M-scope designed as a modification of a radar set used by the United States Signal Corp. Following the geophysical survey a follow-up with a bulldozer is planned. - V. S.

8716. Nikiforov, N. A. Geophysical Methods as Means of Detecting and Studying Gold Deposits (in Russian). Bull. (Izvestiia) Acad. Sci., URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 4, 1945, pp. 389-398.

Magnetic and electrical methods were applied for exploring gold deposits in the Trans-Baikal and Ural regions of USSR. The favorable results obtained appear to justify recommending these methods for gold prospecting and intensive study of related deep-lying formations. Three examples of exploration are described.

1. The magnetic exploration of a Trans-Baikal gold deposit dealt with partly metallic sulfide and quartz-sulfide veins imbedded in crystalline

formations. Measurements of the vertical magnetic component gave a distinct differentiation of geological elements: syenites and gabbro-diorites registered high positive readings, and granodiorites and diorites gave low readings. Some sulfide beds produced the lowest readings. Evidence was found of two veins, as illustrated by the appended isogam map.

2. The natural-potential survey of the same deposit also yielded high geological differentiation. Such measurements were possible because of the processes of restorative oxygenation, which occur in and about sulfide veins and usually produce distinct electrical polarization. The differentiation was due to variations in sulfide content, tectonic processes, and microtectonics. Actual correspondence between anomalies and veins has been checked by some boring. The anomalies detected are discussed and shown on an isopotential map. A 200- by 40-meter density of observations is recommended for surveys.

3. Another natural-potential survey was made in the southern Urals. It had to do with gold-bearing quartz veins and quartz-sericite-chlorite lenses imbedded in a narrow strip of carbon-graphite slates detected in formations of modified clay, sericite clay, chlorite, and mica. The survey showed that carbon-graphite slates registered potentials of high intensity. The results are plotted in an isopotential map. The author concludes from the total evidence that electrical and magnetic methods can be used for the exploration of gold deposits. - V. S.

8717. Phelps, H. S., and Kahn, F. Galvanic Corrosiveness of Soil Waters. Elec. Eng., New York, vol. 64, April 1945, p. 156.

Data are presented on the electrode potentials and polarization characteristics of copper, lead, iron, and carbon in soil waters that vary in pH from 2 to 12. The following tentative conclusions are drawn: (1) Galvanic corrosiveness on lead, copper, and iron appears generally more severe for soil waters of low pH than for those of high pH. (2) Indications are that the static potentials of lead and iron are virtually constant in soil electrolytes of pH up to approximately 10; as pH is increased above 10, lead becomes more negative and iron more positive. The potential of copper becomes more negative in substantially straight-line relation with increasing pH. Carbon potentials appear to be virtually independent of pH. (3) For electrodes of lead, copper, iron and carbon in soil waters, the relation of degree of polarization to pH of electrolyte seems to show definite trends. - Corrosion, vol. 1, No. 3, 1945, Abstracts, p. 22.

8718. Poldini, Edouard. Quelque considerations sur l'interprétation géophysique (Certain Considerations Relative to Geophysical Interpretation). Bull. Lab. Géol., Mineral., Géophys., Musée Géol. Univ. Lausanne, Switzerland, No. 79, 1944, 8 pp.

A problem in electrical prospecting solvable graphically was submitted to seven persons - geophysicists, geologists, engineers, and technicians - in order to determine the extent to which a subterranean relief can be reconstructed on the basis of electrical measurements. Each person received only

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a blank sheet with values of apparent resistivity inscribed over a net of stations having a certain minimum density. The invitation was to draw the corresponding contour lines of equal resistivity and to give a geological interpretation. The relief had been taken from the topographic map of the region of Verdun, France, and could be regarded as composed of an electrically conductive layer of variable thickness resting on an infinitely resistive basement. The net of stations was one-third as dense as demanded by the theoretical requirements on density with a view to meeting practicable costs. The geological problem and the method of resistivity prospecting are discussed, partly in mathematical terms.

The seven contour maps offered as solutions and a map of the true relief show that the three maps drawn by geologically competent men approach the correct solution closely whereas the other maps drawn by engineers, technicians, and one geologist deviate from it widely. The different answers are analyzed for the causes of error. - V. S.

8719. Vargas, M. Nota sobre prospeccao geofisica pelo metodo das resistividades (Note on Geophysical Prospecting by the Electrical Resistivity Method). Bol., Depart. Estr. Rodag., Sao Paulo, Brazil, vol. 7, No. 23, 1941, pp. 149-160.

General discussion of method, interpretation, and application. Three examples are presented of surveys executed by the Soils Section of Institudo de Pesquisas Technologicas with a purely experimental purpose. Conclusion as to efficiency and low cost of method are made in the light of a comparison with borehole drilling. - Engineering Index, 1941, p. 533.

8720. Willman, H. B., Reynolds, R. R., and Herbert, Paul, Jr. Geological Aspects of Prospecting and Areas for Prospecting in the Zinc-Lead District of Northwestern Illinois. Illinois Geol. Surv., Urbana, Rep. Invest. 116, 1946, 48 pp.

In northwestern Illinois, commercial deposits of zinc have been found in the area of Galena, Jo Daviess County. Conditions here prove unfavorable to exploration because outcrops are insignificant, drilling records unavailable, and geophysical methods unsuccessful; the local geology is described. However, some results were achieved with the self-potential method over mineralized zones of considerable thickness, where the top is above groundwater level but less than 100 feet deep. Still, interpretation is difficult because the patterns obtained by self-potential mapping are influenced by variations in soil composition and moisture, topography, depth of bedrock, character of basement formations, nature of ore bodies, and other factors. Therefore, only a few of the detected anomalies may be related to mineralization. Further research is deemed necessary to develop successful methods of prospecting for minerals. - V. S.

5. RADIOACTIVE METHODS

8721.Campbell, J. L. P., and Winter, A. B. A Review of General Notes on Radioactivity Well-Log Interpretation. Tomorrow's Tools - Today, Los Angeles, vol. 12, No. 2, 1946, pp. 21-24.

The wide use of radioactivity logs in recent years has led to an accumulation of comprehensive data on their interpretation, rendering a systematized summary desirable. The general material, presented in tables and graphs, relates to physical borehole conditions, contamination with radioactive substances, such as silt, bentonite, volcanic ash, etc., determination of true thickness of a sandstone or limestone zone on a gamma-ray log, and correlation with electrical logs. The more particular information consists of 30 basic items regarding the responses of gamma-ray and neutron curves to typical formation characteristics. - V. S.

8722.Condon, E. U., and Curtiss, L. F. New Units for the Measurement of Radioactivity. Rev. Sci. Instrum., Lancaster, Pa., vol. 17, No. 6, 1946, p. 249.

The United States Bureau of Standards, at the suggestion of the National Research Council, recommends the adoption of new units for the measurement of radioactivity. The curie, currently in use, can only represent the disintegration rate of radium, or its products, in equilibrium. In measuring the strength of radioactive sources, however, it is necessary to measure the disintegration rate dependent upon the decay constant and the number of atoms of the radioactive isotope in the source. This is simply a number that can be most conveniently expressed in units of 10^6 disintegretions per second, under the designation "rutherford", abbreviated "rd". The microrutherford would then be one disintegration per second. Such a unit eliminates the need of measuring radio-isotopes solely in terms of a standard and opens the way to other methods.

The elimination of the curie makes it also necessary to adopt for the measurement of gamma-ray sources the unit roentgen-per-hour at one meter, abbreviated as r.h.m., which has a gamma-ray strength 1.18 times that of 1 curie of radium. - V. S.

8723.Good, W., Kip, A., and Brown, S. Design of Beta-Ray and Gamma-Ray Geiger-Müller Counters. Rev. Sci. Instrum., Lancaster, Pa., vol. 17, No. 7, 1946, pp. 262-265.

Every laboratory working in the field of radioactivity develops many types of Geiger-Müller counters. From time to time, different groups have published descriptions of well-tested examples of counters, which have met certain requirements with particular success. This paper describes three types of counters that have proved particularly useful in this laboratory. These are the mica window, bell-type beta counter, a modified bell counter used as an X-ray counter, and a high-sensitivity bismuth-screen gamma counter of conventional design. - Authors' abs. (A report from the Physics Laboratory, Massachusetts Institute of Technology. - V. S.)

8724. Gorshkov, G. V., Grammakov, A. G., Starik, I. E., and Shpak, V. A. Some Data on the Physical Foundations of Radioactive Geophysical Methods of Exploration (in Russian). Intern. Geol. Congr., Report of the 17th Sess., 1937, Moscow, vol. 4, 1940, pp. 495-497.

Radioactive methods of exploration fall into three groups measuring, respectively, radiations, emanations, and air saturation and ionization. These are described briefly and appraised. Attention is devoted to the use of alpha, beta, and gamma rays. The coefficients of the diffusion of radioactive emanation in rocks are found to vary within the limits of (6.5 - 1.0) 10^{-2} cm. ^{2}/sec., according to the nature and condition of the rocks. The emanation potency of the minerals investigated varies from 0.07 to 98.5 percent. Other results of measurements are given. It is concluded that a knowledge of the emanation properties of rocks is essential for the interpretation of radioactive logging and surveying data. - V. S.

8725. Lorenz, E., Weikel, J., and Norton, S. Counting Rate and Frequency Meter. Rev. Sci. Instrum., Lancaster, Pa., vol. 17, No. 7, 1946, pp. 276-279.

A counting rate and frequency-meter circuit using a thyratron as pulse-leveling device is described. It is characterized by its simplicity and its high resolving power of approximately 1 x 10^{-5} second for evenly spaced pulses. - Authors' abs.

8726. Mercier, V. J. Interpretation of Radioactivity Logs. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 12, No. 1, 1946, pp. 12-19, 31.

Utilization of subsequent data has proved the accuracy of interpretation made from gamma ray and neutron curves. Both curves are discussed and the value of their combined use is demonstrated. - Author's abs.

8727. Oil News, Albuquerque, N. Mex. Atomic Energy May Revolutionize Oil-Locating Methods. Vol. 22, No. 1, 1946, p. 2.

I. A. Berger, C. W. Sheppard, and V. Burton, M.I.T., offer laboratory evidence that crude oil is formed by a radioactive transformation of organic substances under atomic bombardment in the earth. They have turned fatty acids isolated from ocean-bottom mud into oil-type hydrocarbons by subjecting them to bombardment in a cyclotron. Radon, a gas formed by the spontaneous disintegration of radium, was used as the source of alpha particles. In the earth, the atomic energy would be provided by the radioactivity of various minerals. If this hypothesis proves correct, prospecting instruments tracing intense radioactivity in the subsurface could serve for detecting oil deposits. (See also Oil & Gas Jour., vol. 44, No. 49, p. 60). - V. S.

8728. Polkanov, A. A., and Gerling, E. K. An Absolute Time Scale for the History of the Earth (in Russian). Bull. (Izvestiia) Acad. Sci., URSS, Moscow, Sér. Géol., No. 2, 1946, pp. 29-38.

In the present paper the authors discuss the application of lead and helium methods of age determination to the plotting of an absolute time scale for the geological history of the earth. Instructions are given regarding the choice of minerals to be gathered for a determination by the helium method. - Authors' abs.

8729. Walker, J. M., and McGaha, S. W. Full Knowledge of Well Conditions Aids in Radioactivity Well-Logging Operations. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 12, No. 2, 1946, pp. 14-16.

Radioactivity logs serve for correcting, confirming, and amplifying information on oil wells gained by other means. In turn, logging operations are aided by advance study of all the information available. Particularly useful is knowledge of logging instruments, physical characteristics of the well, and local geology. The casing program of the well should be known, because radioactive curves are affected by aluminum and magnesium pipes, plastics for plug-back or squeezing, contaminating radioactive material, and a nitroglycerin shot-hole width; both the logging procedure and the interpretation of logs have to be adjusted to these particulars. For suspending logging equipment in a well, a derrick supplied with a special lubricator is recommended. Other items of tested practice are listed. A sample of a standard log heading illustrates the text. - V. S.

Walker, R. C. Electronic Equipment and Accessories. Chem. Pub. Co., Brooklyn, N. Y., 1945, 393 pp. Price, $6. (This book has a chapter on impulse counting; see abs. 8753 in this issue.)

6. GEOTHERMAL METHODS

8730. Flugge-de Smidt, R. A. H. The Measurement of the Geothermic Gradient by Means of the Clinical Thermometer. Jour. Chem., Met. & Min. Soc. South Africa, Johannesburg, vol. 45, Nos. 7-8, 1945, pp. 105-127.

The writer measured the geothermal gradient in a working mine on Rand Leases, Witwatersrand, with a view to determining the temperatures encountered down to a depth of 9,000 feet. The previous observations in Crown mines suggested the method adopted. Clinical thermometers were lowered on a frame of ducoed hardwood to a depth of 4,000 feet. The thermometers were kept frozen before and after use, and packed with crushed ice in their recesses in the frame; the frame itself also was cooled. The method's advantages, procedures, corrections, precision, observations, and curves of results are described, and the findings analyzed in the light of theoretical considerations. The temperatures obtained fitted an equation of second degree: $T = 64.96 + 30.305r + 0.181r^2$, where r is the depth in thousands of feet. For 8,000 feet, the temperature would take the value of 103° ± 2° F, if it continued to increase with the same regularity. Comments by J. P. Rees follow (pp. 137-141). (See also abs. 8732 in this issue and Geoph. Abs. 125, No. 8566. A summary appeared in Chem. Eng. & Min. Rev., vol. 38, No. 445, 1945, pp. 23-24.) - V. S.

8731. Grim, R. E., and Rowland, R. A. Differential Thermal Analysis of Clays and Shales, a Control and Prospecting Method. Illinois Geological Survey, Urbana, Ill., Rep. Invest. 96, 1944, 23 pp.

The differential thermal method, by determining the thermal reactions undergone by a clay or shale, is a rapid means of identifying the mineral components and properties of such materials. Analyses are here presented for sequences of samples from the pits of several operating clay plants in order to illustrate the way in which the method can be applied in prospecting and in plant control. Analyses are also given for the pure forms and synthetic mixtures of the common components of clays and shales and for a variety of well-known types of clays. - Author's abs.; abridged by V. S.

8732. Weiss, Oscar. Temperature Measurements in a Mine on the Witwatersrand with an Electrical Resistance Thermometer. Jour. Chem., Met. & Min. Soc., South Africa, Johannesburg, vol. 45, Nos. 7-8, 1945, pp. 127-141.

The author and Flugge-de Smidt made parallel but independent thermal surveys on Rand Leases, Witwatersrand, to prognosticate temperature at the depth of 9,000 feet (see also abs. 8730). The author used a platinum resistance thermometer in which electrical resistance changed according to Callender's equation; measurements had a precision within 0.1° F. This thermometer was lowered into boreholes at the end of wooden rods screwed together, and wire connections with a Callender-Griffith bridge gave immediate temperature readings at the surface. Altogether, about 250 points were measured in 17 boreholes.

The temperatures obtained are tabulated, plotted, and discussed. They show inordinate thermal anomalies and instabilities, a prolonged effect of drilling, and a possible influence of the dip of strata; corresponding recommendations are made relative to further measurements. The temperature curve approximates a straight line and permits the prediction of the values sought by the investigator: 91.7° F. at 6,000 feet, 96.4° F. at 7,000 feet, and 101.3° F. at 8,000 feet. This prediction virtually coincides with that of Flugge-de Smith. In the accompanying comment, J. P. Rees compares the two methods. - V. S.

7. GEOCHEMICAL METHODS

8733. Bronston, Allen. Newer Phases in Geochemical Technique. Oil Weekly, Houston, Tex., vol. 119, No. 9, 1945, pp. 56-58.

Field studies have been made recently in Pottawatomie and Seminole Counties, Oklahoma, on geochemical detection of subsurface oil and gas. Soil samples free of vegetative matter were collected at depths of 5 to 150 feet in a series of holes bored at regular intervals. They underwent analyses for the content of solid, liquid, and gaseous hydrocarbons; techniques are described. The data of chemical extraction served for plotting curves of hydrocarbon concentration for depths of 5, 50, and 100 feet.

The profiles show that hydrocarbon diffusion, effusion, and permeation through the covers of reservoirs have both a qualitative and a quantitative regularity. Certain relationships can also be detected between the types of reservoirs and the hydrocarbon concentration and distribution in the overlying strata. It is noted that shallow samples can lead to false conclusions, whereas those from a depth of 100 feet point to the existence of an oil reservoir. - V. S.

8734. Campbell, O. E. The Fluorographic Method of Petroleum Exploration. World Petrol., New York, vol. 17, No. 3, 1946, pp. 54-56.

Fluorescence is a measurable property of the earth significantly related to the occurrence of oil. Its value in exploration has been demonstrated by surveys in Texas and Mississippi. The fluorographic method employed consisted in measuring the fluorescent intensities of surface and subsurface samples and plotting contour maps and fluorologs (U. S. Patent 2,356,454).

In a surface survey, earth samples of 1 ounce are collected at a depth of 2 feet over grids having intervals of 0.12 to 0.25 mile and covering areas of 25 square miles. These samples are then exposed to ultraviolet rays in the fluorograph apparatus for photographing their fluorescence, and the density of each image is measured by a transmission photmeter to determine its fluorescent intensity. The data obtained serve for plotting isofluor maps. The geological interpretation of fluorescent anomalies is discussed and illustrated by maps.

In logging operations, samples are collected at intervals of 10 to 20 feet and analyzed for fixed and free fluorescence emitted by their solid materials and free oil and gas. A fluorolog shows four curves: (a) Two curves of the fixed and free data for original and composite samples, and (b) two curves of progressive average fluorescent intensity, fixed and free, at different depths of the well. Samples of fluorologs are shown and their curves are interpreted. - V. S.

8735. Pirson, S. J. Emanometric Oil and Gas Prospecting. Petrol. Eng., Dallas, Tex., vol. 17, No. 4, 1946, pp. 132-142.

The emanometric prospecting technique endeavors to measure the absolute emanation per unit area of the earth's crust for one or more gases of diagnostic value in order to detect commercial oil or gas accumulations. Different pieces of evidence point to the existence of micro seepages, but various objections have been raised. For example, methane is formed from decaying vegetation and cannot be used as a reliable indicator of the occurrence of subterranean oil and gas accumulations.

Ethane is believed to be a satisfactory indicator; higher hydrocarbons also could be employed, but their rates of diffusion are lower. The observed rates of emanation of ethane are of the same order as those predicted on the assumption that the formations show an over-all permeability of 10^{-7} darcy. In the field, the emanations are collected by adsorber tubes, which are then taken to a laboratory for degassing, fractionation, and identification of the diagnostic gases. - G. D. H., Jour. Inst. Petrol., vol. 32, No. 271, 1946, pp. 197A-198A; abridged by V. S.

8. UNCLASSIFIED GEOPHYSICAL SUBJECTS

8736. American Geophysical Union. Supplementary Information Relating to Education in Geophysics. Transactions, Washington, D. C., vol. 27, No. 4, 1946, pp. 614-617.

The tabulation of courses offered in American colleges and universities is brought to completion (for pt. 1 see Geoph. Abs. 125, No. 8574). This information furnishes guidance to students of geophysics in choosing schools, but it must be further amplified by consulting the catalogues and authorities of the schools. The American Geophysical Union (5241 Broad Branch Road, N. W., Washington 15, D. C.) offers aid with regard to specific questions. - V. S.

8737. Barsch, Otto. Aufgaben der angewandten Geophysik in Grossdeutschland und im östlichen europaischen Raum (Problems of Applied Geophysics in Wider Germany and Eastern Europe). Jahrb. d. Reichsamts für Bodenforsch., 1942, Berlin, vol. 63, 1944, pp. 682-780.

The author presents an account of geophysical exploration in Germany and the USSR prepared in collaboration with H. Reich, R. Zwerger, H. Closs, and others. The text covers primarily gravimetric, seismic, electrical, magnetic, and radioactive investigations. It deals with principles, procedures, instruments, geologic interpretation, and practical examples illustrated by numerous maps, profiles, graphs, and diagrams; particular attention is devoted to the gravimetric method. Problems of effective exploration of German territories are analyzed, the greatest promise being found in the eastern and northwestern regions; still greater possibilities are believed to exist in the USSR. Suitable geophysical approaches are discussed. A bibliography is appended. - V. S.

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8738.Belote, E. S. Adjustment of Traverse. Trans. Amer. Geophys. Union, Washington, D. C., vol. 27, No. 3, 1946, p. 307-315.

This paper outlines a method of relating the corrections to the measured distances and the corrections to the observed angles in the adjustment of traverse to achieve a fit with the fixed data with the least distortion. The method is flexible enough to meet the needs of various types of problems. Although it does not give absolute results, it should prove very satisfactory if used with judgment. - Author's abs.

8739.Cortes, H. C. Publication of Geophysical Case Histories. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 287-291.

The Society of Exploration Geophysicists has authorized publication of a collection of geophysical case histories. A series of volumes is contemplated, and the cooperation of members requested. Suggestions are made as to how to safeguard information desired withheld by companies and to insure legal protection for it. - V. S.

8740.Ewing, Maurice. Training for Research in Geophysical Borderlands of Geology. Trans. Am. Geophys. Union, Washington, D. C., vol. 27, No. 4, 1946, pp. 553-554.

Training for geophysical exploration necessarily must cover a wide range of subjects, particularly in the basic sciences of mathematics, physics, geology, chemistry, and biology. This can be achieved within the ordinary curriculum of the colleges only by early specialization. In order that a prospective student of applied geophysics may begin to take the proper electives in his undergraduate studies and even in high school, he should have the guidance of his eventual teachers of graduate courses. Professors of geophysics and geology will have optimally prepared classes if they form contacts with promising students in the lower schools and in colleges. - V. S.

8741.Ewing, M., and Woollard, G. P. Recent Geophysical Investigations in the Atlantic Ocean Basin (abs.). Econ. Geol., Lancaster, Pa., vol. 40, No. 8, 1945, p. 590.

During the war, the cooperation of geophysicists, submarine geologists, and oceanographers with the Navy's research program was particularly close and effective. It led to improvements in the methods of both deep-sea and shallow-water seismic surveys, to advances in the techniques of underwater photography, and to the development of other rapid systems for collecting information about the sediments. Some examples of the results achieved by investigators working at the Woods Hole Oceanographic Institution are presented.

As an example of an entirely new tool for the exploration of ocean basins, a method of acoustically scanning the floor of the deep ocean is explained. This method is particularly promising for the location of active submarine volcanoes and isolated submerged mountains which cannot easily be found by conventional sounding techniques. - Abridged by V. S.

8742.Gabriel, V. G. Electronics in the Petroleum Industry. Petrol. Eng., Dallas, Tex., vol. 17, No. 9, 1946, pp. 107-118.

Electronics can be defined as a branch of science that comprises the phenomena observed in passing conduction currents through vacuum or gases, as well as the devices based upon them. Electronic devices play an important part in seismic and in some of the electrical prospecting methods. The usefulness of electronics in gravimetric, magnetic, and other geophysical techniques is also well-marked. The accompanying chart gives an approximate picture illustrating the application of electronics in the petroleum industry. - Author's abs., abridged by V. S.

8743.Gayer, R. B. Mechanical Aids to Prospecting. Western Miner, Vancouver, B. C., vol. 19, No. 6, 1946, pp. 44-48.

In British Columbia, prospectors for minerals must avail themselves of modern scientific and mechanical aids if they are to compete with large companies. Such aids include geophysical instruments, airplanes, helicopters, aerial photography, dropping of supplies, portable drills, bulldozers, mechanical gold pans, etc.; their application in prospecting is described. The helicopter enables a prospecting crew to hover over mineral areas at a desired elevation, study the terrain in detail, and then alight at the points of interest to analyze samples; other advantages are indicated and costs are discussed. The usefulness of aerial photography is stressed. - V. S.

8744.Guyod, Hubert. Well-Logging Methods Studied at Texas A & M. Petrol. Eng., Dallas, Tex., vol. 17, No. 7, 1946, p. 218.

The Engineering Department of the A & M College of Texas gave a refresher course of 12 lectures in well logging for students and returning servicemen. The subjects discussed covered general problems of logs, radioactivity logging, electrical logging, permeability logging, geochemical logging, temperature logging, and other approaches. A classification of logging methods and the properties investigated by them is presented, with remarks on the principles of radioactivity and permeability logging. - V. S.

8745.Krug, J. A. Development of Oil and Gas on the Public Domain. U. S. Senate, Committee On Public Lands and Surveys, 2d session, S. 1,236, pt. 2, 1946, Washington, D. C., pp. 231-252.

In testifying before the U. S. Senate Committee on Public Lands and Surveys as regards S. 1,236, a bill to promote the development of oil and gas on the public domain, the Secretary of the Interior expressed agreement with provisions for encouraging geophysical prospecting and stressed the need for furthering geological exploration as well: "I am for the United States Government doing everything in its power to encourage the search for oil reserves. I think that the discovery of new oil reserves and the conservation of those we have are two of the Government's most important responsibilities, and that industry should be encouraged in every possible way." - V. S.

8746. Lisiutin, A. Ia. On the Propagation Velocity of Sound in Oil Wells (in Russian). Bull. (Izvestiia) Acad. Sci., URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 1, 1945, pp. 40-49.

In 1943, echo-metric (sonic) surveys were made in the oil wells of the Ishimbai region, USSR, by means of the tube of Kundt, the echo-lead, and sound reflectors. The empirical results are analyzed for the different methods employed, mathematical equations are deduced for the velocity of sound in gas media dependent upon certain geophysical and geometrical parameters, and statistical procedures for the treatment of echo-metric data are discussed. It is found empirically and theoretically that the velocity of sound does not change perceptibly throughout the depth of oil wells in the Ishimbai region; its value is consistently 306 m/sec. Therefore, placing sound reflectors at great depth in sonic surveys is unnecessary. - V. S.

8747. Mackay, D. K., and Sanders, J. W. Oil and Gas Development in Arkansas in 1945. Am. Inst. Min. & Metal. Eng., Statistics of Oil and Gas Development, 1945 (1946), pp. 1-20.

The production of oil and gas in Arkansas generally is confined to two distinct and widely separated regions - South Arkansas in the Gulf coastal plain and northwest Arkansas in the Arkansas Valley. Exploration during 1945 centered largely in these two producing regions, but some of the geophysical surveys were made a considerable distance outside of them. Geophysical work increased from 164 crew weeks in 1944 to 286 crew weeks in 1945, divided as follows: 161 seismic, 92 gravimetric, and 33 magnetometric crew weeks; their distribution by counties is shown on a map. - V. S.

8748. Rosaire, E. E. The Premium Technological Discovery of Petroleum. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 335-349.

Premium technological discovery volume is that achieved in excess of the volume to be anticipated on the basis of price alone and which can be attributed solely to technological advance. Three degrees of freedom - area, method, and objective - are recognized for the prospector, and these are fixed by choice in any prospecting venture. Continued operation with these three degrees fixed inevitably leads to diminishing returns and finally to marginal operations wherein price becomes the primary motivation.

Considerations are presented for a return to premium technological discovery within the United States. Such a return for the method now in most general use, the reflection seismograph, can be expected to follow from unfixing the area degree of freedom through initiating prospecting along the continental shelf. However, such a return for prospecting as a whole, and probably of even greater magnitude, can be anticipated to result from unfixing the method degree of freedom through widespread application of novelty in prospecting methods. - Author's abs.; abridged by V. S.

8749. Rothé, Edmont. Questions actuelles de géophysique théorique et appliquée (The Present Problems of Theoretical and Applied Geophysics). Gauthiers-Villars, Paris, 1943, 427 pp.

This exposition of theoretical and applied geophysics embodies the material presented by the author to his classes. Particular attention is devoted to the latest researches and theories. The chapters deal with the province of geophysics, gravity and weight, gravity anomalies on the globe, new methods of gravitational studies, gravimeters and balances, isostasy and cleavages, radioactivity in the earth's crust, volcanism, seismology, and terrestrial magnetism. The treatment is calculated to suggest the lines of further development of geophysics. - V. S.

8750. Standard of California. Finding Oil by Science. San Francisco, Calif., vol. 32, Spring Bull., 1945, pp. 2-3.

The essentials of the methods of gravimetric, magnetic, and seismic oil exploration are stated briefly, and the difficulties encountered in virgin country are indicated. The geological and geophysical surveys of the California Co. have covered 83 million acres in the past 4 years. - V. S.

8751. Van Tuyl, F. M., et al. Developments in Geophysics (1945). Quart. Colorado Sch. Mines, Golden, Colo., vol. 41, No. 3, 1946, pp. 52-67; also pp. 22-37, 68-71, 77-128, 145-203.

This account of geophysical developments during 1945 consists of reviews of some 60 representative papers of the year. It covers explorational statistics, principal trends, technical advances, logging of wells, contributions to regional geology, and the postwar outlook. Independent accompanying sections are devoted to geochemical prospecting, developments in the training of geophysicists and geologists, fluorescence and spectroscopy, geological maps and publications, aerial photography, and other related subjects. A novel feature is a brief outline of exploration and development in Africa, Asia, Australia, New Zealand, Europe, North America, West Indies, and South America. A bibliography is appended. (See also abs. 8774 in this issue). - V. S.

8752. Ver Wiebe, W. A. Exploration for Oil and Gas in Western Kansas During 1944. Geol. Surv. of Kansas, Lawrence, Bull. 56, 1945, 112 pp.

Exploration for oil and gas in Kansas reached an all-time peak in 1944. Extensive geophysical work was carried on, and partly on the basis of it 53 new oil or gas pools were discovered. - V. S.

8753.Walker, R. C. Electronic Equipment and Accessories. Chemical Pub. Co., New York, 1945, 393 pp. Price, $6.

Intended chiefly for "practical engineers, mechanics, students, and other readers who at least have acquired the elements of electricity and magnetism, but who are not specialists in the use or design of electronic apparatus," this book presents an introduction to the principal aspects of electronics and describes the devices and accessory equipment now in use in industry. The opening chapter deals with the fundamental characteristics of thermionic valves, and there follow among the other 14 chapters such titles as "Amplification of Steady and Low-frequency Voltages," "Gas-filled Valves," "Light-sensitive Devices," "The Cathode-ray Tube: Fundamental Principles," "Miscellaneous Electronic Devices: Small Switch-gear," "Impulse Recording or Counting," and "Miscellaneous Circuit Accessories." - Mines Mag., vol. 36, No. 5, 1946, p. 201.

8754.Williams, David. Mineral Resources of the World. The Advancement of Science, London, vol. 3, No. 10, 1945, pp. 206-221.

In reviewing the mineral resources of the world, the author dwells briefly on methods of their discovery. He takes the view that only a few more great mineral districts may yet be found by surface geology, as were the Witwatersrand gold, the nickel of Ontario, the iron of Brazil, or the copper of Rhodesia in the past. The discoveries of the future will come increasingly from deep exploration by geophysical methods. The conditions for successful work by these methods are outlined, the magnetic, electrical, and electromagnetic approaches to the search for metals are discussed, and the present limitations necessitating further research are indicated. - V. S.

8755.Wilson, R. E. The Petroleum Industry's Real Reserve - Technology. Min. Mag., Denver, Colo., vol. 36, No. 5, 1946, pp. 187-191, 200.

This review of petroleum technology includes a section on geophysical exploration. The gravimetric, magnetic, seismic, and electrical-logging methods are explained briefly and their precision is indicated. The gravimeter records the elongation of a millionth of an inch in a spring supporting a weight; corrections are made for altitude changes of as little as 1 foot and for humidity changes affecting the buoyancy of the air. The seismograph measures the electric current produced in a coil of wire when a magnet suspended in this coil moves only one ten-millionth of an inch.

Such precision of measurements is essential in exploration, because relatively little oil has been discovered in the United States so far - less than 2 cubic miles in volume. The greatest contribution was made by the seismic method. During the past decade, seismic surveys accounted for nearly three-quarters of the new oil fields discovered. - V. S.

8756.World Petroleum. Geological Surveys are Planned for Continental Shelf. New York, vol. 16, No. 12, 1945, p. 65.

After the introduction of new legislation in the United States, the United States Geological Survey has been asked to make recommendations for a survey of the submerged floor of the continental shelf, an area exceeding 750,000 square miles. Seismic surveys can be made, and magnetic surveys are possible by means of aeroplanes. Submarines could carry out gravimetric surveys. The three most promising areas are the cost of the Gulf of Mexico, the Pacific coast, and the Alaskan region.

The shelf is taken to be the area covered with not more than 600 feet of water. Its width varies widely. Off the United States coast in the Gulf of Mexico, the area involved is 149,000 square miles. - G. D. H., Jour. Inst. Petrol., vol. 32, No. 266, 1946, p. 30A.

9. RELATED NONGEOPHYSICAL SUBJECTS

8757. Andreev, N. N., and Brekhovskikh, L. M. Propagation of Sound in Water, as Affected by Depth of Submersion. Compt. rend. (Doklady) Acad. Sci., URSS, Moscow, vol. 47, No. 6, 1945, pp. 400-402.

A summary is given of the previous mathematical findings of L. Brekhovskikh on sound propagation in water (see abs. 8760 in this issue). To verify these deductions, experiments were made at sea. A point source emitted a sound from a depth at least equal to the draft of the survey ship, and the sound pressures were measured at a distance of 100 meters with a hydrophone placed at a depth of 4 meters. The frequencies employed increased up to 12,000 cycles.

The results are analyzed within a frequency range compatible with a point source. A curve is plotted for the mean frequency of octaves against the ratio between the pressures measured at a source depth of 2 meters and the pressures measured at a source depth of 4 meters; another and a third curve are plotted for measurements made for source depths of 1, 2, and 3.5 meters. In all the three curves, the ratio approaches unity with the increase of frequency. These empirical curves closely correspond to previously deduced theoretical curves. - V. S.

8758. Baker, M. B. Gold and Iron Prospects in Canada. Trans. Roy. Soc. Canada, Ottawa, vol. 37, No. 4, 1943, pp. 1-8.

Most of the 60,000,000 ounces of gold that has been produced by Canada has been mined since 1900. Before 1900 gold came mainly from rich placers, and a search for pre-Cambrian drainage patterns might reveal further rich deposits. Geophysical prospecting might discover iron ores of the Lake Superior type. - M. A. P., Mineral. Mag., London, vol. 27, No. 193, 1946, Abstracts, p. 234.

8759. Bergmann, Ludwig. Ultrasonics and Their Scientific and Technical Applications. John Wiley & Sons, New York, 1944 (?), 264 pp. Price $4. (Translated from German.)

This book deals with high-frequency sound waves and their applications in science and technology. The material covers the generation of ultrasonics, detection and measurements of waves, determination of velocity and absorption in different media, and various particular uses; attention is centered on the experimental work. The laws of sound valid for the audible range hold also for the inaudible or ultrasonic range, though additional phenomena appear in the latter case. The modern methods of generation make it possible to produce ultrasonic vibrations of a frequency as high as 5 by 10^5 kc., so that the shortest ultrasonic waves have the wave magnitudes of visible light. Many investigations can be made without interference from boundary walls. - V. S.

8760.Brekhovskikh, L. M. Sound Propagation from a Source Placed in Water at Small Depth. Compt. rend. (Doklady) Acad. Sci., URSS, Moscow, vol. 47, No. 6, 1945, pp. 396-399.

When a source of sound is placed in water at shallow depth, its power is dampened by proximity of the surface. The problem under consideration is mathematical determination of the depth at which the effect of the surface disappears.

A solution is sought for three particular cases: (1) Deep sea, where reflections from the bottom can be disregarded. The equations deduced show that half of the power would be emitted if the source of sound were submerged to 1/6 of its mean wave length. (2) Finite depth with a bottom giving absolute reflections, a case opposite to the first considered. An optimal power would be obtained if the source were submerged to a depth ranging from 1/6 to 1/4 of its mean wave length. (3) Point source placed on a screen, e.g., at the bottom of a hemisphere. Such a source does not differ materially from a similar source located at the shortest distance from a free water surface as measured along the curvature of the hemisphere. In all three cases the depth of the source determines not only the effective power of the sound but also the spatial distribution of sound pressure. - V. S.

8761.Cox, B. B. Transformation of Organic Material into Petroleum Under Geological Conditions. Bull. Amer. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 5, 1946, pp. 645-659.

This outline lists observations that are being used to guide a geologically coordinated laboratory study on the transformation of organic material into petroleum by chemists, biologists, physicists, and geologists. The effect of the movement of fluids and gases through sediments on the alteration of petroleum and its possible bearing on the origin of petroleum are omitted from this outline because of the broad nature of this subject. Migration will have to be considered in future studies after basic conditions and processes of transformation of organic material into petroleum have been proved. Limiting conditions are confined to marine organic origin of petroleum, temperature and pressure limits, and time. An evaluation of present knowledge with some suggestions for future studies in chemistry, physics, and biology under conditions simulating geologic history are given. - Author's abs.

8762. DeLury, J. S. Correlation of Schistosity and Tectonic Theory. Am. Jour. Sci., New Haven, Conn., vol. 239, No. 1, 1941, pp. 57-73.

Common views of schists and their attitudes are derived largely from hypotheses that take little account of the possible importance of intrusion as a cause of major deformation. In contrast, the writer favors the interpretation that deformation is brought about mainly by the forceful migration and intrusion of magma. The attitudes of foliation and their relations to folded and unfolded bedding planes seem to support such a concept. The chief conclusion is that bedding-plane foliation, as exhibited in sedimentary formations that were deeply buried and invaded by granitic magmas, is best explained by differential stresses set up by the forceful, horizontal invasion of these magmas. - Author's abs., abridged by V. S.

8763. DeLury, J. S. Compression Creep of Rubber and Rock. Jour. Geol. Chicago, Ill., vol. 50, No. 2, 1942, pp. 189-199.

The slow kind of movement against outside resistance, named "compression creep," suggests the view that the rate of geological deformation is correlated better with small forces operating through long time than with mighty forces in critical periods. A laboratory demonstration of this hypothesis may be made with rubber sheets. The author applies the principle of compression creep to problems involved with overcoming of friction along the soles of overthrusts, the rate and periodicity of mountain folding, and the deformation of the earth by the weight of ice sheets. - Author's abs., abridged by V. S.

8764. Forrester, J. F. Principles of Field and Mining Geology. J. Wiley & Sons, New York, 1946, 647 pp. Price, $7.

This book analyzes geological field techniques applicable particularly to mining problems. It deals with the recognition of geological phenomena in the field, methods of surveying and of recording field observations, and the interpretation and use of data. Under prospecting methods are discussed pit, shaft, and trench sinking, bulldozing, borehole drilling, and geophysical exploration. The latter is treated essentially in the light of C. H. Heiland and J. J. Jakosky's expositions of the principles and methods of applied geophysics. Magnetic, electrical, gravimetric, and seismic methods are outlined. - V. S.

8765. Glen, J. A. New Role of the Canadian Prospector. Western Miner, Vancouver, B. C., vol. 19, No. 6, 1946, pp. 59-61.

In Canada, the prospector is becoming an integral part of the system of mineral development, and his role in it promises to grow in importance. Government departments, mining companies, and prospectors' associations promote instruction in scientific methods, preparation of geological and topographical maps, and improvement of transportation facilities. With these aids, the prospector is able to concentrate on the remote, unexplored parts of the Canadian Shield promising extensive mineral discoveries. Possessing a unique knowledge of wilderness, he increasingly acts as a scout for the mining companies that follow him with detailed scientific exploration. - V. S.

8766. Goldstine, H., and Goldstine, A. The Electronic Numerical Integrator and Computer (ENIAC). Math. Tables & Other Aids to Comput., Washington, D. C., vol. 2, No. 15, 1946, pp. 97-110.

A description is given of the construction, operation, and applications of the electronic computing machine ENIAC recently made public by the United States Army Ordnance. To insure accuracy, ENIAC normally handles 10-digit numbers but can be made to operate up to 20 digits. The apparatus is a large U-shaped assemblage of 40 panels, which together contain about 18,000 vacuum tubes and 1,500 relays. These panels are grouped to form 30 units, each performing one or more of the functions requisite for the calculations assigned.

The units comprise 20 accumulators for addition and subtraction, a multiplier, a combination divider and square rooter, three function tables for storing numbers, constant transmitter of stored or punched-card numbers, IBM card reader, IBM tabulator, master programmer, initiator, printer, and cycling unit. Instructions are given to each unit separately or through the master programmer by means of various systems of control switches. The operation of ENIAC is illustrated by an example of computation. - V. S.

8767. Koch, W. An Adjustable Scale For Measuring Instruments. Jour. Sci. Instrum., London, vol. 22, May, 1945, pp. 94-95.

A method is described for constructing and using a scale that compensates for calibration errors. The principles involve the use of three fixed points; the appropriate scale reading is determined by the intersection of a movable line with an arc passing through each point of the scale. The line is adjusted by reference to the fixed points. - Phys. Abs., vol. 48, No. 575, 1945, p. 298.

8768. Oil Weekly. 1946 World Oil Atlas. Houston, Tex., May 20, 1946, 320 pp. Price $1.

In this atlas are included maps of all the countries, colonies, and territories of the world having commercial oil production or conducting oil exploration. An introduction presents world maps of airlines, commercial oil movement, and petroleum possibilities, as well as statistics of petroleum reserves and crude production. The maps of the different countries and parts of countries are accompanied with explanatory and historical information and statistical tabulations. For the United States, productive and nonproducing wildcats drilled to date and other additional data are included. The statistical information of the atlas is brought up to 1946. - V. S.

8769. Pettersson, Hans. Iron and Manganese on the Ocean Floor. Meddelanden fran Oceanografiska Institutet i Goteborg, No. 7, 1945, 37 pp.

Problems related to the varying content of manganese and iron in deep-sea deposits are discussed, as a contribution to submarine geology. The hypothesis of a biological extraction from the seawater of the two elements, recently revived by Correns, is found inadequate, and alternative explanations are considered. Lines for future research are indicated. - Author's abs.

8770. Pirson, S. J. Reflections on the Origin of Oil. Mineral Industries, State College, Pa., vol. 15, No. 5, 1946, pp. 1, 3-4.

The telluric-electrolytic theory of petroleum genesis, migration, and accumulation is discussed with a view to furthering the finding of oil deposits. This theory grew out of an accidental association between earth currents and Koble's electrolytic hydrocarbon synthesis. It distinguishes three phases in the process of oil formation - syngenetic, diagenetic, and epigenetic; these are described. Gigantic electrolytic media, or cells, are postulated, in which electrical currents transport organic ions from their place of burial toward regions of higher potential (such as sediments or traps) serving as anodes.

Such a theory furnishes to oil prospectors both an indication of the direction in which to explore, once the potential source beds are recognized, and a method of determining whether a bed has already yielded negligible, partial, or complete amounts of its oil potential. If the yield is only partial, commercial oil and gas fields can be expected in the subsurface. - V. S.

8771. Raaf, J. F. M., de. Notes on the Geology of the Southern Rumanian Oil District, With Special Reference to the Occurrence of a Sedimentary Laccolith. Quart. Jour., Geol. Soc. London, vol. 101, Nos. 401/2, 1945, pp. 111-134.

The Tertiary stratigraphy and tectonics of the Carpathian foothills north of Bucharest are described briefly. Apart from slow movements during sedimentation, there are two major folding phases, in pre-Burdigalian and post-Levantine times, respectively. Normal salt plugs similar to the "salt domes" of other countries occur, usually in the core of anticlines. Elsewhere along faults, intrusions of salt breccia have been observed. In the vicinity of Campina, an intrusion of clayey salt-breccia along bedding planes in the Sarmatoid sequence is described in detail. This body of salt-breccia does not represent an ancient mud-flow contemporaneous with the Sarmatoid beds, but an intrusion at a later date of foreign sedimentary material. Rock-salt, although present near the surface in its immediate vicinity, has not been observed in the above-mentioned intrusion, for which the author uses the term "sedimentary laccolith". - Author's abs.

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8772. Science Illustrated. Prospecting by Air. New York, vol. 1, No. 4, 1946, pp. 30-32.

Mineral deposits manifest themselves on the surface by landmarks identifiable on aerial photographs. Salt domes indicative of oil possibilities have an unmistakable contour. Iron and copper ores lying close to the surface kill vegetation and produce open spaces. Chromium and nickel also may denude the soil. Gold, copper, and silver usually are found where rocks break the surface. A rotted upper surface of underground rock betrays underlying greenstone, granite, or quartz. To distinguish rock from soil on aerial photographs, the difference between their indices of light reflection may be used. Geologists look forward to electronic equipment for measuring the wave length of reflected light as a means of identifying ground formations. Color films also show significant color variations in soil, rock, and vegetation. Furthermore, the camera catches the swell of an underground formation beneath a plain, and stereoscopic pictures help to discern its contours. - V. S.

8773. Umbgrove, J. H. F. The Pulse of the Earth. M. Nighoff, The Hague, 1942, 179 pp.

This book deals with the periodic events of the earth in their chronological sequence. Five recurring stages can be distinguished: (1) World-wide regression of the epicontinental seas, intensive erosion, and intrusion of acid batholiths; (2) decreasing crustal compression, emergence of mountain chains, and formation of geosynclines and basins; (3) growth of mountains, formation of rift valleys, volcanism, and outpouring of basic lavas; (4) erosion of mountains and rise of ocean level; and, finally, (5) vast expansion of epicontinental seas and mild climate. Such sequence has taken place twice since Cambrian time, with a periodicity of 250 million years; it is termed the cosmic cycle. Such conclusions are based by the author upon the research of Vening Meinesz, Barrell, Bucher, Daly, Griggs, Holmes, Wegener, Joly, DuToit, Still, Suess, Cloos, and others. Tables and plates illustrate the text. (A review by W. Ver Wiebe appeared in Bull. Am. Assoc. Petrol. Geol., vol. 30, No. 2, 1946, pp. 279-280). - V. S.

8774. Van Tuyl, F. M., et al. Review of Petroleum Geology in 1945. Quart. Colorado School Min., Golden, Colo., vol. 41, No. 3, 1946, 203 pp.

As in the preceeding issues of the annual Review of Petroleum Geology, the subject is broadly treated to include developments in basic geologic sciences and such borderline fields as geophysics, geochemistry, and the interpretation of aerial photographs, in addition to the more restricted phases of geology applied in the oil industry. The text as well as the bibliography of the present issue is more complete than in earlier ones. The inclusion of a new section on world exploration and development is believed to be justified because of the growing interest in foreign reserves. - Author's abs., abridged by V. S.

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8775.Waldschmidt, W. A. Gramp's Field, Archuleta County, Colorado. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 4, 1946, pp. 561-580.

Gramp's oil field, Archuleta County, Colorado, was discovered in 1935, and until now virtually no information pertaining to the field has been released for publication. This article sets forth details regarding the geology of the field. The oil is being produced from the Dakota sandstone (Upper Cretaceous), in which it has accumulated against an east-west fault that crosses a north-south anticlinal axis. The average thickness of the producing part of the Dakota sandstone is 152 feet. - Author's abs., abridged by V. S.

8776.Waugh, B. W. Air Photography in Canada. Western Miner, Vancouver, B. C., vol. 19, No. 6, 1946, p. 48.

A brief outline is given of the development of air photography in Canada (essential for surveys with the airborne magnetometer). Contour maps from ground photographs appeared in 1888. Then cameras were placed on airplanes and served for mapping Canadian territory during 1920-39. Up to 250,000 square miles were photographed vertically and 600,000 square miles by oblique photographs, the latter by the so-called Canadian method. The use of photogrammetry in the war brought about improvements in planes, camera lenses, emulsions, processing methods, and photo paper. In the United States, the Canadian oblique method was developed into the trimetrogon method, which the Army Air Force used for photographing about 15 million square miles. It is proposed to apply this method in Canada for mapping some additional 1,500,000 square miles in order to complete the local air charts. - V. S.

8777.Weber, V. V. Oil-Bearing Facies of Productive Formations (in Russian). Bull. (Izvestiia) Acad. Sci., URSS, Moscow, Sér. Géol., No. 2, 1945, pp. 6-25.

The author has studied the oil-bearing facies of productive formations in the southeastern Caucasus near the Baku region. The investigation revealed continental, deltaic, and lagoonal facies, the distribution of which is described. When analyzed in relation to oil accumulation, this distribution indicates that the lagoonal facies are the only ones invariably associated with oil. They are found in the oil-bearing marginal zone of the post-Pontine basin of Baku on the Apsheron peninsula, and they extend in the form of bays to Kabristan and the Kura depression, also known to contain oil. Moreover, the various environmental conditions prevalent in that geological epoch, such as the quiescent character of the basin, high salinity, and alternation of sand and clay, should have favored oil formation. These observations led the author to conclude that lagoonal facies contain primary oil and have diagnostic value in oil exploration. - V. S.

8778. Work, R. A. Mechanized Transport for Snow Surveying. Trans. Amer. Geophys. Union, Washington, D. C., vol. 27, No. 3, 1946, p. 396-399.

This paper gives the reasons for the increased interest of surveyors in mechanized travel on snow, lists 12 characteristics to be noted in the performance of such machines, and describes a series of field tests of a particular make of snow vehicle. This vehicle, which is described, met the requirements of performance. - Author's abs.

8779. Wrather, W. E. Mineral Resources and Resourcefulness. Min. Mag., Denver, Colo., vol. 36, No. 5, 1946, pp. 185-186, 200; also Min. & Metal, New York, vol. 27, No. 475, 1946, pp. 427-428.

Mineral discovery and development in the United States is reviewed briefly from the standpoint of the depletion of natural resources by the war. During the last 40 years, few discoveries of major importance have been made in virgin territory. The principal deposits now mined were known at the beginning of the century, and they approach exhaustion. In order to advance exploration, a new philosophy of "discovery thinking" should be adopted.

As an example of the success of such thinking, the phenomenal record of petroleum discoveries in the United States during the 1930's, achieved by the cooperation of geologists and geophysicists, is cited; another example is the discovery of potash in New Mexico in 1925. To parallel these successes in the mining industry, it is necessary to gain an understanding of the laws of ore deposition, prepare topographic and geological maps, conduct basic investigation and trial experimentation, and inaugurate a broad program of exploration. The Federal Government should assist the industry in these efforts essential to the welfare of the entire nation. - V. S.

10. PATENTS

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8780. (1) Toestel voor meten van de versnelling der zwaartekracht of verandering daarvan bet behulp van een veerend opgehangen massa (Apparatus for Measuring the Acceleration of the Force of Gravity or the Variation Thereof by Means of a Resiliently Suspended Mass). Bolidens Gruvaktiebolag, Stockholm. Dutch Patent 49,422, issued October 15, 1940.

The mass with its suspending device is completely housed within a vessel of high caloric capacity made of a material of high conductivity. This vessel, in turn, is completely housed in a Dewar vessel. An electric heating device is mounted on the first vessel, preferably consisting of an electric resistance wound about that vessel and regulated by an automatic temperature regulator within it. The purpose of these arrangements is to keep the temperature of the instrument constant, inasmuch as changes in temperature affect the results of measurement. - Claims allowed, 1,

8781.(2) Gyro Flux Valve Compass System. R. S. Curry, Jr., Baldwin, N. Y., assignor to Sperry Gyroscope Co., Inc., Brooklyn, N. Y., a corporation of New York. U. S. Patent 2,393,974, issued February 5, 1946.

A gyro flux valve compass system comprising a flux valve, means for rotatably supporting said flux valve, a directional gyro, precessing means for changing the azimuthal position of the gyro, electrical means controlled by the gyro and operable thereby in its azimuthal movement to position said rotatable flux valve in azimuthal agreement therewith, and means responsive to the output of said flux valve for controlling said precessing means for the gyro, whereby said gyro, through the electrical means controlled thereby, may restore the flux valve to its original position if said flux valve should depart therefrom. - Claims allowed, 12.

8782.(2) Apparatus for Responding to Magnetic Fields. V. V. Vacquier, Oakmont, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U. S. Patent 2,406,870, issued September 3, 1946.

An apparatus responsive to magnetic fields, comprising a pair of cores of material of high permeability and so characterized that the hysteresis loop thereof exhibits a sharp knee where saturation is reached, means for generating periodic sawtooth wave forms, and for cyclically energizing said cores therewith to saturation, whereby each core abruptly reaches saturation at a phase of the energizing cycle, which is shifted by changes in the ambient field at said core, windings adjacent said cores connected in opposition to deliver the difference between the voltages induced by said cores, whereby said phase shifts cause production of sharp voltage pulses that vary in magnitude with a change in field at either one of the cores, and transducing means selective to said pulses, in energy-receiving relation to said windings. - Claims allowed, 9.

8783.(2) Apparatus for Responding to Magnetic Fields. V. V. Vacquier, Garden City, N. Y., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U. S. Patent 2,407,202, issued September 3, 1946.

An apparatus responsive to space gradient of magnetic field comprising a pair of slender cores of minimal cross-sectional area and of material of high permeability and so characterized that the hysteresis loop thereof exhibits a sharp knee where saturation is reached, said cores arranged parallel to each other and with a space between them such that the gradient may establish a difference in field at their respective locations, means for cyclically energizing said cores to saturation in the same sense whereby each core abruptly reaches saturation at a phase of the energizing cycle which is shifted by changes in the ambient field of said core, windings adjacent said cores connected in opposition to deliver the differences between voltages induced by said cores, whereby said phase shifts cause production of sharp voltage pulses which vary in magnitude with a change in field at either one of the cores, and transducing means selective to said pulses in energy-receiving relation to said windings. - Claims allowed, 6.

8784.(3) Method and Apparatus for Recording Seismic Waves. J. P. Minton and R. A. Broding, Dallas, Tex., assignors to Socony Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U. S. Patent 2,392,758, issued January 8, 1946.

Apparatus for detecting and recording seismic waves that comprises means to generate an electrical carrier current wave of a frequency higher than that of the seismic waves to be detected, means to modulate said carrier current wave in accordance with said seismic waves, means to filter said modulated carrier current wave to eliminate unwanted frequencies, a recorder for recording the filtered signals, and means to vary the amplitude of the carrier current wave to vary the sensitivity of the apparatus. - Claims allowed, 12.

8785.(3) Explosive Cartridge Assembly. Richard Martin, Tulsa, Okla., assignor to Illinois Powder Manufacturing Co., St. Louis, Mo., a corporation of Illinois. U. S. Patent 2,396,518, issued March 12, 1946.

A multi-explosive cartridge column comprising a plurality of standard paper-wrapped cartridges disposed in endwise abutting relation and a plurality of sleeves disposed in end-to-end relation around said cartridges, said cartridge extending into said sleeves from opposite ends thereof, and metal strips extending through the respective sleeves along the inner faces of said sleeves and bent over the ends thereof, said strips having a plurality of longitudinally spaced prongs struck therefrom that bite into the paper wrapping of said cartridges when the latter are inserted in said sleeves and are inclined in a direction that will bring about an increased gripping action of said prongs under forces tending to separate said cartridges and sleeves. - Claims allowed, 2.

8786.(4) Method of Surface Prospecting. R. G. Piety, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,390,270, issued December 4, 1945.

The method of electrical prospecting comprising establishing a sequence of stations at spaced points along a traverse on the surface of the earth, supplying a constant low-frequency, alternating, electric current to a fixed earthed current electrode at a distance from said stations at least 20 times the distance between adjacent stations and to each station in succession to

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cause flow of electric current there-between, the distance between each of said stations and the earthed current electrode being substantially constant for each successive station; and successively measuring the potential at each of a series of stations adjacent each station to which current is supplied, relative to a fixed earthed potential electrode spaced from said stations at a distance at least 20 times the distance between adjacent stations, said earthed potential electrode being spaced at a great distance from said earthed current electrode. - Claims allowed, 2.

8787.(4) Well Logging. G. S. Bays, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,392,357, issued January 8, 1946.

A method of logging the strata traversed by a drill hole filled with fluid, comprising passing an electrical current between two spaced points in said hole, producing a first voltage proportional to the impedance to flow of said electrical current, producing a second voltage proportional to the impedance of said fluid only, applying the difference in said voltages to a variable impedance, varying the value of said impedance inversely in relationship to the diameter of said bore hole and producing an indication proportional to the current through said impedance, whereby a specific resistivity log of said strata can be made. - Claims allowed, 2.

8788.(4) Method for Determining the Oil Content of Subterranean Formations. H. G. Doll, Houston, Tex., assignor to Schlumberger Well Surveying Corp., Houston, Tex., a corporation of Delaware. U. S. Patent 2,395,617, issued February 26, 1946.

A method of determining the oil content of an oil-bearing formation traversed by a bore hole, comprising taking a core of said formation, determining the lithological character of the core and the salinity of the formation water, preparing one or more samples of material having the same lithological character as said formation and containing accurately predetermined proportions of oil and water, said water having the same salinity as said formation water, and the number of samples being sufficient to afford an accurate knowledge of the relation between resistivity and oil content, water-content ratio over a continuous range of oil content, water-content ratio values, determining said relation, measuring in the bore hole the electrical resistivity of the formation, and comparing said measured resistivity with said relation to determine the oil content corresponding to said measured resistivity. - Claims allowed, 4.

8789.(4) Method and Apparatus for Electrically Coring in Cased Boreholes. G. H. Ennis, Long Beach, Calif., assignor of one-half to Robert V. Funk, Long Beach, Calif. U. S. Patent 2,397,254, issued March 26, 1946.

An apparatus for locating strata in a well having a casing therein, being a combination of: a casing circuit including a ground connection of opposite electro-potential relative to said casing, and an external conductor connected to said ground connection and said casing; a well circuit, including an electrode movable in said well, a ground connection of opposite electro-potential relative to said electrode, and an external conductor connected to said ground connection and to said electrode; means for electrically connecting said circuits; and electrical measuring means for one of said circuits. - Claims allowed, 14.

8790.(4) Method and Apparatus for Electrically Logging Wells. G. E. Archie, Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,400,678, issued May 21, 1946.

In a method for determining the salinity of the liquid present in the formations traversed by a borehole not containing an electrically conductive liquid, the steps of positioning at substantially the same level in the borehole a plurality of confined electrolyte bodies each having different calibrated electrolytic properties, causing a plurality of spontaneous potentials to be created by establishing a liquid junction between each of said electrolyte bodies and the formation liquid, simultaneously and separately recording said spontaneous potentials, and determining the salinity of said formation liquid by comparing the values of the spontaneous potentials created at the junctions of said formation liquid with each of said calibrated electrolyte bodies. - Claims allowed, 5.

8791.(4) Werkwijze voor onderzoeken van ondergrondsche lagen (Method of Studying Subterranean Strata). Standard Oil Development Co., New Jersey. Dutch Patent 48,412, issued May 15, 1940.

A difference of potential is imparted to two electrodes placed in the earth, and the characteristics of the current between them are recorded at a number of points on the earth's surface. Two pairs of measuring electrodes are placed on the earth's surface along the path of the current between the electrodes connected with an indicating instrument, so that a variable component of the current is received by each pair and the difference is observed on the instrument. - Claims allowed, 1.

8792.(4) Werkwijze en inrichting foor het onderzoekn van den inhoud van een boorgat (Method and Device for Studying the Contents of a Borehole). N. V. De Bataafsche Petroleum Maatschappij, The Hague. Dutch Patent 49,197, issued September 16, 1940.

The purpose of this invention is to locate, by means of electric devices, water incursions into oil wells. An apparatus equipped with two electrodes and an electronic tube is lowered into the borehole, and the variations of the plate current of the tube are measured. These variations are caused only by changes in the composition of the material of the borehole between the two electrodes, one of which is connected with the cathode and the other with the grid. - Claims allowed, 3.

8793.(5) Soil Analysis by Radiant Energy. Edward Lipson, Houston, Tex. U. S. Patent 2,394,703, issued February 12, 1946.

In the logging of wells, the method comprising the steps of obtaining formation samples at different levels within a well, applying radiant energy such as gamma rays to the samples, and measuring the relative amount of radiant energy transmitted through different ones of said samples as an indication of the hydrocarbon content of such samples due to the original proximity of the samples to formations containing hydrocarbon fluids. - Claims allowed, 5.

8794.(5) Radiation Detector. D. G. C. Hare, Houston, Tex., assignor, by mesne assignments, to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,397,071, issued March 19, 1946.

A device of the Geiger counter type for detecting gamma radiation, comprising a metallic plate member forming a cathode, said plate being provided with at least one hole, and an anode member comprising a wire extending through said hole and insulated from said cathode plate. - Claims allowed, 9.

8795.(5) Radiation Detector. D. G. C. Hare, New York, N. Y., assignor to Texaco Development Corp., New York, N. Y., a corporation of Delaware. U. S. Patent 2,397,072, issued March 19, 1946.

A radiation detecting device comprising a plurality of plates disposed in separated, substantially parallel relation about a center axis, the major portion of each plate being inclined with respect to said axis, and the inclined portions of adjacent plates crossing a plane disposed at right angles to said center axis, said plates being connected together to form a cathode, each of said plates being provided with at least one hole, with the holes in the plates disposed in alignment, and an anode member comprising a wire extending through said aligned holes. - Claims allowed, 11.

8796.(5) Radiation Detector. D. G. C. Hare and Gerhard Herzog, Houston, Tex., assignors, by mesne assignments, to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,397,073, issued March 19, 1946.

In a radiation detecting device of the counter type, a supporting envelope, a pair of metallic plates connected together electrically to form a cathode, said plates being disposed in separated parallel relation to provide a space therebetween, and an anode disposed in said space, said anode including means for causing concentration of the field between said anode and said cathode. - Claims allowed, 13.

8797.(5) Radiation Detector. D. G. C. Hare and Gerhard Herzog, Houston, Tex., assignors, by mesne assignments, to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,397,074, issued March 19, 1946.

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A detector of gamma radiation comprising a substantially rectangular frame, a second substantially rectangular frame within and at right angles to said first frame, said second frame being electrically insulated from the first mentioned frame, a plurality of cathode plates supported in parallel spaced relation by two opposite sides of the first frame, and a plurality of anode wires supported by two opposite sides of said second frame, said wires passing between and parallel to said cathode plates. - Claims allowed, 6.

8798.(5) Radiation Detector. D. G. C. Hare and Gerhard Herzog, Houston, Tex., assignors, by mesne assignments, to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,397,075 issued March 19, 1946.

In a detector of penetrative radiation in which a cathode and an anode are disposed in a gas-filled housing and connected to a source of high electrical potential, means for minimizing leakage between said cathode and anode comprising electrical insulators between said cathode and said anode, a metallic member adapted to support said insulators, thereby supporting said cathode and said anode, and means for connecting said supporting member to a source of potential intermediate that to which said cathode and said anode are concerned. - Claims allowed, 7.

8799.(6) Remote-Reading Temperature Instrument. Richard Scott, Toronto, Ontario, Canada, assignor to General Electric Co., a corporation of New York. U. S. Patent 2,393,197, issued January 15, 1946.

A receiver for a direct current telemetering system comprising an annular magnetic core with an air gap therein, a magnetic rotor substantially concentrically mounted within said core and permanently magnetized transversely to its axis of rotation and the axis of said core, a pair of windings linking said core, said windings being spaced with their centers less than 180 degrees along the solid portion of said core and substantially equally distant from the air gap therein, said windings each comprising a pair of coils connected in bucking relation, and a direct current source of supply connected to supply one coil of each winding in proportion to the voltage of said source, and to supply the remaining coils of each winding in proportion to a variable to be indicated by such receiver, such that at one end of the range of operation of the receiver the resultant flux of one winding is zero and the resultant flux of the other winding is in a given direction in the core, and at the other end of the range of operation the resultant flux of the last-mentioned winding is zero and the resultant flux of the first-mentioned winding is in the opposite direction in the core. - Claims allowed, 1.

8800.(6) Thermal Prospecting. L. W. Blau, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,403,704, issued July 9, 1946.

A method for prospecting for oil, which comprises drilling boreholes at spaced points over an area to be surveyed, suspending a thermometer in each borehole at a selected depth, the depths being substantially the same for all boreholes and being at least sufficiently great to exclude the effect of surface conditions, pouring earth into the hole above the thermometer so as to reproduce as nearly as possible the conditions obtaining before the hole was drilled, allowing the thermometer to remain in place until successive readings thereof, at suitable time intervals, are substantially the same, thereby indicating that thermal equilibrium has been reached, and recording the reading of the thermometer after equilibrium has been attained for the purpose of correlating it with similar readings made in other holes to determine the contours of isotherms. - Claims allowed, 4.

8801.(7) Apparatus for Analyzing Hydrocarbons. H. E. Metcalf, Walnut Creek, Calif., assignor to Consolidated Engineering Corp., Pasadena, Calif., a corporation of California. U. S. Patent 2,393,650, issued January 29, 1946.

Apparatus for analyzing hydrocarbon gas, comprising a test chamber; an anode and a cathode with a gas-sensitive, low-work-function surface located in said chamber; means for measuring the electron emission from said cathode; means for measuring the pressure within said chamber; means for feeding a stream of hydrocarbon gas to be tested into said chamber; and means for creating a high degree of vacuum in said chamber. - Claims allowed, 4.

8802.(7) Apparatus for Gas Analysis. W. M. Zaikowsky, Pasadena, Calif., assignor, by mesne assignments, to Consolidated Engineering Corp., Pasadena, Calif., a corporation of California. U. S. Patent 2,393,674, issued January 29, 1946.

Apparatus for analysis of soil gas for hydrocarbons indicative of petroleum deposits, comprising purifying train means for removing hydrogen and carbon monoxide from the gas to be analyzed, combustion chamber, a valved conduit connecting said means to said combustion chamber for transfer of gas from said means to said combustion chamber, first heating means mounted within said combustion chamber for oxidizing said gas in said combustion chamber, measuring means associated with said combustion chamber adapted to indicate changes in the molal volume of said gas, and second heating means enclosing said combustion chamber for maintaining the water of combustion in vapor phase during such measurement. - Claims allowed, 4.

8803.(9) Apparatus for Determining Permeabilities of Porous Media. J. T. Hayward, Tulsa, Okla. U. S. Patent 2,390,252, issued December 4, 1945.

Apparatus for determining the permeability of a porous medium, comprising a pair of fluid conduits connected to a common source of fluid supply and arranged in a bridge structure having the Wheatstone arrangement, each of said conduits comprising one side of said bridge structure, the first of said conduits including a pair of adjacent arms designated as a first arm and a second arm, and the second of said conduits including a pair of adjacent arms designated as a third arm and a fourth arm; a pressure-balancing conduit connecting the two sides of the bridge at points intermediate each pair of adjacent arms, pressure balance-indicating means operatively associated with said pressure-balancing conduit, said first and second arms consisting of a single elongated tubular body having a fluid inlet at one end thereof, a fluid outlet at the opposite end thereof, and an opening intermediate the ends thereof communicating with said pressure-balancing conduit; a plunger extending into said tubular body through one end thereof, the degree of clearance between said plunger and said body being such as to define a restricted fluid passageway to thus provide a first permeance in said first arm and a second permeance in said second arm, means for interposing a porous medium in said third arm, said fourth arm comprising an elongated tubular member having a fluid inlet at one end and a fluid outlet adjacent the opposite end; a tapered plunger reciprocable in the bore of said body through said opposite end, the clearance between said tapered plunger and said body being such as to define a fluid passage, means for reciprocating said tapered plunger within said body to vary the permeance of the fluid passage, an index associated with said tapered plunger for indicating the longitudinal position of said tapered plunger relative to said tubular body, and means for causing fluid to flow from said source simultaneously through said pair of conduits. - Claims allowed, 3.

8804.(9) Radio Navigation System and Method. H. C. Morgan, Dayton, Ohio, assignor, by mesne assignments, to Curtis Engineering Co., Inglewood, Calif. U. S. Patent 2,396,112, issued March 5, 1946.

The method of aerial navigation which enables a pilot to cause his aircraft to follow a desired course, which includes defining the course on the ground with a series of relatively high-efficiency reflectors laid out in a regular pattern, propagating a beam from the aircraft, causing the beam to systematically scan the ground below the aircraft, and indicating the relative position of any reflected portions of the beam, the reflected portions of the beam giving an indication of course and altitude.

An aerial navigation system for enabling a pilot to fly an aircraft over a predetermined course comprising means on the aircraft for propagating a narrow ultra high-frequency radio beam, means for causing the beam to systematically and repeatedly scan the ground below the aircraft, reflecting means on the ground laid out in a regular pattern along the predetermined course for reflecting said beam to the aircraft when it falls thereupon, and means on the aircraft for indicating its course and altitude by the relative location of the reflecting means when a reflection occurs. - Claims allowed, 14.

8805.(9) Electronic Surgical Metal Body Locator. D. M. Speaker, East Orange, N. J. U. S. Patent 2,393,717, issued January 29, 1946.

An electronic surgical metal body locator comprising a tuned circuit, means for probing having therein a coil connected in said tuned circuit, an oscillator of the negative transconductance type connected to said tuned circuit, and oscillator means adapted to produce a high-frequency signal, means for mixing the frequencies of said oscillations to produce an output beat-frequency signal, a frequency indicating device, and an amplifier between said mixing means and said signalling device. - Claims allowed, 12.

8806.(9) Object Detecting Apparatus and Method. W. W. Hansen, R. H. Varian, and S. F. Varian, Garden City, N. Y., assignors to the board of trustees of The Leland Stanford Junior University, Stanford University, Calif. U. S. Patent 2,406,371, issued August 27, 1946.

Object-detecting apparatus, comprising means for producing a stream of electrons; means, including a first cavity resonator in energy-interchanging relation with said stream, for velocity-modulating said stream; means for causing said velocity-modulated stream to become bunched; means, including a second cavity resonator in energy-interchanging relation with said bunched stream, for extracting high-frequency energy therefrom; means, coupled to said second resonator, for transmitting high-frequency energy toward an object to be detected; means, coupled to said first cavity resonator, for receiving high-frequency energy reflected from said object; and means for detecting changes in the velocity variations of said electron beam to provide an indication of said object. - Claims allowed, 38.

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Standard of California	(8)	8750
Standard Oil Development Co., N. J.	(10)	8791
Starik, I. E.	(5)	8724
Taylor, J.	(3)	8703
Trappe, F.	(3)	8691
Umbgrove, J. H. F.	(9)	8773
Vacquier, V. V.	(10)	8782,8783
Van Tuyl, F. M.	(8)	8751
________	(9)	8774
Vargas, M.	(4)	8719
Varian, R. H.	(10)	8806
Varian, S. F.	(10)	8806
Vening-Meinesz, F. A.	(1)	8658
Ver Wiebe, W. A.	(8)	8752
V'iunov, B. F.	(2)	8674
Waldschmidt, W. A.	(9)	8775
Walker, J. M.	(5)	8729
Walker, R. C.	(5,8)	8753

	Class	Abs.
Waugh, B. W.	(9)	8776
Weber, V. V.	(9)	8777
Weikel, J.	(5)	8725
Weiss, Oscar	(6)	8732
Williams, David	(8)	8754
Willman, H. B.	(4)	8720
Wilson, R. E.	(8)	8755
Winter, A. B.	(5)	8721
Wolf, Alfred	(3)	8704
Woollard, G. P.	(8)	8741
Work, R. A.	(9)	8778
World Petroleum	(8)	8756
Wrather, W. E.	(9)	8779
Zaikowsky, W. M.	(10)	8802